



SATURDAY, DECEMBER 21, 1872.

Whitcher's Rotary Steam Engine.

Rotary steam engines seem to belong to that class of problems which remain unsolved for many years, until some unknown element has a definite value assigned to it, after which no difficulty is found in putting into practical use what before existed only in theory. Ever since the days of Watt, rotary engines have been the subject of numberless inventions, and nearly every inventor and amateur engineer has attempted at some time or other to devise such a machine.

The engravings herewith represent what seems to us to be one of the most promising inventions of this kind. It has been put into practical operation by the parties who control the patent. Fig. 1 is a perspective view, and fig. 2 a transverse section. The engine consists of two cylinders, A and B, which are placed side by side, and which are preferably cast in one piece, and with shafts, C and D, in the center of each. To these shafts are attached two eccentric cylinders, E and F, which revolve with the shafts, and are made of such a size that their sides furthest from the shaft are always in contact with the inner surface of the cylinders, A and B, thus leaving a crescent-shaped space between the inside and outside cylinders. G is a sliding valve or piston, which moves in a suitable opening between the two cylinders. On the shafts C and D are cog wheels of equal size, which gear into each other or into an intermediate wheel, as shown in the perspective view. The revolutions of the two shafts are therefore simultaneous, and if the two eccentric cylinders are placed in the same position, the distance between them will always be exactly the same; and the valve G will be moved backward and forward and fill the space between the two cylinders. A steam-tight joint is formed at the points of contact by the packing pieces J, J. It will thus be seen that the valve G forms an abutment for the steam to act against. I, I, are the ingress, and H the exhaust ports. The valve L is intended for a cut-off valve, but its operation will not now be described. The valve G has cavities, M, N, O, P and R, for taking and exhausting the steam. The cavity O is connected by an opening, represented by white dotted lines, with the cavity P; and N is connected in the same way with R. In the position in which the eccentric cylinders are now represented, steam is admitted into the cavity M, and from there enters the cylinder and acts against the eccentric E, while the exhaust steam escapes by the cavity P from the opposite side. When F passes beyond the valve G, steam will enter from the cavity N and thence to R and into the cylinder. At the same time the exhaust steam will escape by O and thence to P and out through H. In this way a continuous rotary motion is produced. Both the cylinders are taking and exhausting steam at the same time, and the one is at the point of maximum power when the other is at the minimum.

The patent for this invention is owned by Messrs. Peter Fields & Son, of Jersey City, who are manufacturing these engines. They may be seen in operation at the works of that firm, and inquiries may be addressed to them for further information.

Tennessee Railroad Commissioners.

A meeting of the Board of Railroad Commissioners of the State of Tennessee was held at Nashville, November 20, Governor Brown, Comptroller Pennebaker, Secretary of State Butler, and Messrs. McKinney and Fogg being present. The Commissioners declared forfeiture on the installments due from the purchasers of the Winchester & Alabama and McMinnville & Manchester railroads, and ordered them sold within forty days. Messrs. Steers and Patterson, who, March 20, 1872, purchased for the stipulated sum of \$105,000 the Knoxville & Charleston Railroad, making the cash payment, but never having executed bonds for the credit payments, asked of the Commissioners an extension of ninety days in which to give security, agreeing to forfeit all they have paid (about \$33,000) and surrender all of their rights, etc., on failure to comply therewith. The petition was granted. The purchasers of the two roads first mentioned owe for each the sum of \$75,000 to the State of Tennessee.

It is said that the earnings of the Leavenworth Bridge are not about half enough to pay the interest on its bonds of \$700,000, and now the company has brought suit to compel the payment of the individual stock subscriptions to prevent foreclosure. Leavenworth County paid a subscription of \$300,000, and the individual subscriptions, which are for the same amount, seem never to have been paid in, or only to a small extent. Only two railroads use the bridge.

Contributions.

New Roads—A Chapter on Construction.

To say that the American people have a worldwide reputation for "pushing things" is easy enough, but to say how much it costs them to sustain that reputation is another affair. We have been accustomed to smile at our English cousins as "slow coaches," and look upon their plodding movements with something like derision and contempt. But if they do move slow, once over the ground is sufficient; and while we are not content with their way of doing things, we have to do our work twice over and we do not get along so fast after all.

In railroad construction there is an enormous waste occasioned by being in too great a hurry, as is well known, but there are other good reasons why construction should not be allowed to proceed faster than is consistent with a thorough completion of the work. For instance, laying track before the road bed is prepared for it is a bad policy, and this is practiced more or less all over the country. This might be excusable if the track is to be ballasted as fast as laid; but this is not often done, and there is now thousands of miles of track jammed into the mud and fastened there by Jack Frost. And

track is left free; whereas if the track is out of sight it requires men enough for a small army to do anything with it. It is a sad sight for a progressive railroad man to see a large force of men perched upon huge levers with all the avoidupois they can muster "teetering" up and down with all their might, and making no impression on the track, which is glued fast in its bed of clay. But presently a faint wheezing noise is heard, which grows louder and more distinct at every surge, until all at once there is a sound like the spouting of Barnum's whale, and some track is up. There is the rail, dripping with clay porridge; but where are the ties? Some of them are still fondly clinging to the rail, and the spikes hanging pendant on the rail are proof positive that the remainder are still below. These must be resurrected, or others must take their places. As we have gone thus far in track-lifting we might as well see it through. One gang of men must sit quietly on their levers to hold the track (what there is of it) in place, while another delves for the missing ties; others must hold the ties up for spiking, while others spike; but then spikes are missing. (Note.—The Tredgar Iron Works make of spikes, bought for cash.)

Now the ties are all in place, and the entire track for three lengths is ready for ballast—ready for a great deal of it. Look under the ties and you will see under each one a trench just the width of the tie, and 12 inches deep. You see the tie is seven inches thick, and it was down so that the rail must be counted in. Here are these trenches under every tie, and in every space there is a ridge of clay forming the walls to these trenches; and they are excellent for holding water. The men throw in the gravel, and when these trenches are filled it is pretty well exhausted. The track is now resting on a series of water troughs filled with gravel, with ridges of clay between them corresponding in thickness to the spaces between the ties.

Here is good ballast and clay as evenly mixed as can be, and the brick-maker could scarcely do better at making mud.

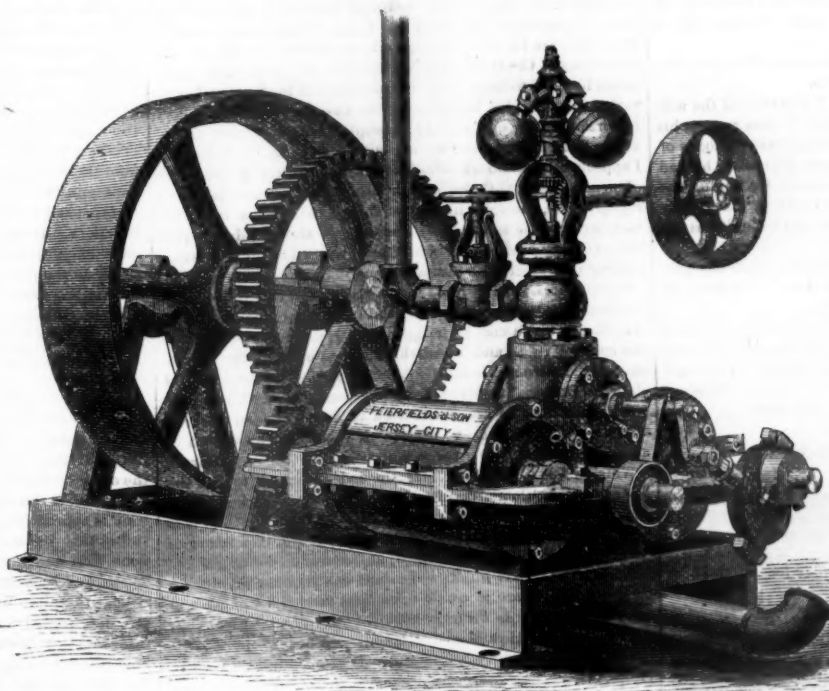
But the track is in much better condition than it was before, and although it is fearfully expensive to raise track in this way, there is no other way than to keep right on doing so as fast as possible, and overtake the track-layers if possible. But there was something said about preparing the road-bed before the track was laid.

Mr. "Hoosier," in the RAILROAD GAZETTE of October 9, tells how it is. He says: "The road-bed should be nicely surfaced, leaving no bumps or depressions to interfere with the placing of the ties. After embankments are finished, you should not allow the teamsters hauling timber and ties to drive across or on top of them. It spoils their symmetry, and cuts them into ugly ruts, from which it often happens that track-laying is greatly delayed just when you are in the greatest hurry." This is about right, only it is sometimes impossible to avoid teaming on the grade. It frequently happens that the whole tracklaying force must be sent ahead to level up the road-bed before the ties can be properly placed, and that seems to put a stop to the whole work. But it is far better to stop everything and level the surface than to throw down track on an uneven surface. It may seem like a waste of time, but in reality it is the quickest way to get along; and moreover, the rails will not be ruined, which is a matter worth looking after.

There is another bad practice connected with hasty construction, viz., leaving out ties. A few ties are thrown down—enough, perhaps, to hold the iron car, and away go the men to another set. Perhaps the calculation is to put in more ties by putting them under the rail before the locomotive gets along; but just as likely as not it is neglected, and some of the rails are fearfully sprung. This putting in back ties is expensive business. It is worse than doing work twice over, for it costs more than four times as much to put a tie under the rail as it does to lay it before the rail is laid.

A few days since the writer of this saw a large force of men putting in back ties. About one-third had been left out (no occasion for it), and heavy trains had settled the track to the rail into a stiff clay, and it was impossible to dig a place for a tie, and the only way was to get levers under the soil and raise the track high enough to slip the tie under the rail. Counting the whole expense of this operation, it actually cost more to put under those scattering ties than all the rest of the track work for the same distance.

Thus it is; we fast Americans do our work backward. We not only beat all creation going ahead, but we beat ourselves in being obliged to back down so far. If railroad builders will grade the road before the track is laid, lay the ties before laying the iron, and never lay track faster than it can be ballasted, they will build a road much quicker, with much less money, and



WHITCHER'S ROTARY STEAM ENGINE.—Fig. 1.

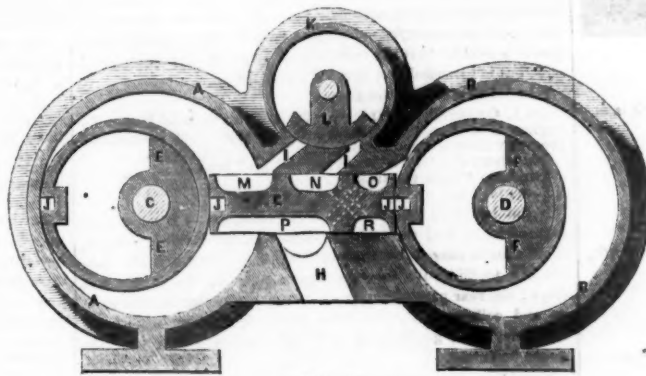


Fig. 2.

here comes in an easy way to take advantage of the fall weather, so that work may proceed through the winter, if desirable. Track frozen in the mud cannot be raised, but track laid on the frozen ground can be ballasted as well as in summer. If track-laying is allowed to get ahead of the ballasting, then all that is not ballasted must remain in a wretched condition through the winter, and if not ruined then it will be when the frost comes out in the spring. To illustrate: Suppose the track-layers are 15 miles ahead of the ballasted track when the road-bed freezes up, and track-laying continues; of course the construction train or supply train must (if it can) run over track that is dangerous, spoiling the rails as well as the rolling-stock, together with a strong probability of being frequently in the ditch. The track laid on the frozen ground can be ballasted and kept in first-class condition, but the trouble will be to get the gravel over this 15 miles of unballasted track, or whatever distance remains unballasted. Of course it is sometimes necessary to lay a considerable stretch of track before gravel can be had, but as soon as it can be reached there should be no delay in putting it to use.

Having bad track to run over during the winter is not the only evil resulting from getting behind-hand with ballasting. When the track is just laid, a small force will be sufficient for a lifting gang, as the ties are not jammed into the clay and

have a better road, than by rushing along regardless of everything but to reach the end as soon as possible. Learn to "make haste slowly."
WM. S. HUNTINGTON.

Calculating Excavations and Embankments— "Hoosier" Criticised Again.

ATCHISON, KANSAS, November 21, 1872.

TO THE EDITOR OF THE RAILROAD GAZETTE:

"Hoosier" has republished his paper No. 7 under new heads. It is somewhat remarkable that from the date of its first publication, October 5, until November 9 (some two weeks after my letter was published), he failed to find out that he had mistaken the heading.* It is not, however, very easily seen where in the article is improved under the new heads from what it was under the old ones.

He says: "To find the area of any cross-section where the ground surface is, laterally, very nearly or quite level, the following rule is sufficiently accurate." And then, "to make this important rule plain," he assumes the sum of the side fillings = 20, and their product = 75. That is, assuming the side-fills themselves to be 15 and 5 respectively.

For these side-fills, with slopes of $1\frac{1}{2}$ to 1, and 16 feet roadway, the base would be 46 feet.

That is to say, in a distance of 46 feet there is 10 feet difference of elevation, or in one mile about 1,150 feet difference of elevation; and this is what "Hoosier" calls "surface that is very nearly or quite level."

This is one of his new heads, and it certainly does not look like a head that is very nearly or quite level.

In another of the new heads he says: "The ratio of the side slope of cuts is most frequently one to one,"† then repeats his former rule for finding areas in this particular case of slopes of one to one, and so leaves it. Why did he not, if possibly he had it arranged under the proper head, give a rule for finding the areas when slopes are $1\frac{1}{2}$ to 1; for even admitting that it may not be often needed in cuts, yet surely it may be quite useful in embankments.

For his rule for finding the area of a triangle (half the product of the base and perpendicular), he does, of course, on account of its novelty, deserve much credit.

Premising that the surface between the center and either slope stake is a plane, the following general formula is given for the benefit of the "young engineer" whom "Hoosier" left floundering in the cut with slopes of one to one. It is not only "sufficiently accurate," but geometrically true.

And first for this demonstration:

Let $A B D G K$ be a section of embankment.

Put $B D$, the width at grade, = W .

" $m A$, the left fill, = L .

" $O K$, the center fill, = C .

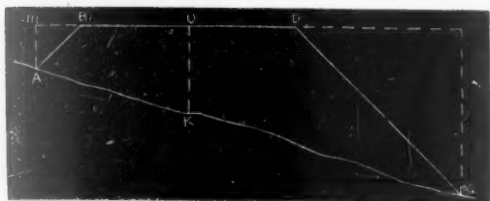
" $n G$, the right fill, = R .

" the ratio of side slopes = S .

Or, call the slopes " S " feet horizontal to one foot vertical.

The distance $m B$ would be = $m A \times S$.

The distance $n D$ would be = $n G \times S$.



Taking first the figure $A K O m$:

$$\frac{Am + OK}{2} \times mO = \text{area } AKOm.$$

From this deduct the area of the triangle AmB , which is =

$$\frac{Am \times mB}{2} = \frac{Am \times Am \times S}{2} = \frac{Am^2 \times S}{2}$$

and we get

$$\frac{Am + OK}{2} \times mO - \frac{Am^2 \times S}{2}$$

= area of that part of section left of center.

In this equation substitute the values of Am , OK and mO ; that is, substitute L for Am , C for OK , and

$$L \times S + \frac{W}{2}$$

for mO , and we get:

$$\frac{L + C}{2} \times (L \times S + \frac{W}{2}) - \frac{L^2 \times S}{2} = \text{area left of center.}$$

that is:

$$\frac{L + C}{2} \times \frac{2LS + W}{2} - \frac{L^2 S}{2}$$

or,

$$\frac{L + C \times 2LS + W}{4} - \frac{2L^2 S}{4}$$

or,

$$\frac{2L^2 S + 2SCL + WL + WC - 2L^2 S}{4}$$

or,

$$\frac{2SCL + WL + WC}{4}$$

or,

$$\frac{2SCL + WL}{4} + C \times \frac{W}{4}$$

or,

$$(2SC + W) \times \frac{L}{4} + C \times \frac{W}{4} = \text{area left of center.}$$

By similar process we get:

$$(2SC + W) \times \frac{R}{4} + C \times \frac{W}{4} = \text{area right of center.}$$

* "Hoosier" forwarded the corrected No. VII as soon as he received "D. T.'s" criticism.—EDITOR RAILROAD GAZETTE.

† I am disposed to think that cuts are more generally made with a slope of $1\frac{1}{2}$ to 1; but, waiving this part of the question, embankments, surely, are almost always made with slopes of $1\frac{1}{2}$ to 1, and a rule for finding the areas of sections having those slopes may be quite useful to the "young engineer."

Add these together, and we get:

$$(2SC + W) \times \frac{L + R}{4} + C \times \frac{W}{2} = \text{whole area.}$$

That is: To the center filling, multiplied by twice the ratio of slope, add the width of roadway; multiply by one-fourth the sum of the filling right and left, and to this product add the product of the center fill by half the width of the roadway. Result is area of cross section.

Take the following example, calling width of roadway 12 feet and slopes $1\frac{1}{2}$ to one:

Station.	Left.	Center.	Right.	Area.
9	f. 4.0	f. 6.0	f. 12.0	156

$$(2 \times 1\frac{1}{2} \times 6 + 12) \times \frac{4 + 12}{4} + 6 \times \frac{12}{2} = 156.$$

When L , C and R become equal to one another, the formula becomes $(S \times C + W) \times C$. D. T.

Rules and Regulations of Massachusetts Railroads.

I have in my notes repeatedly asserted that in the framing of rules for the guidance of railroad employees sufficient care is seldom taken to make each rule full, explicit and easy to be understood by men of the ordinary capacity of the working class of employees, not only by those of experience, but by those who are for the first time taking up their duties. In the operations of the transportation department, where there is so much liability to fatal error, too much is left to "custom" or to verbal instructions; but whether the absence of "written law" is worse than the existence of incomplete, slovenly rules, or vice versa, I can hardly make up my mind. Both are bad enough. I apprehend that no one who has had the control or oversight of men will deny that the clearer, simpler and more complete a regulation is, the more likelihood there exists of its being remembered in the same clear manner. A slovenly-drawn rule will probably produce an indistinct impression on the mind, leading to neglect or to hesitation and doubt in emergency.

On this occasion I propose to draw attention to a very prominent example of this negligent framing of rules, the misunderstanding of which may be fraught with great peril. I refer to the code of rules and regulations agreed upon by the Massachusetts Railroad Commissioners and the "Committee of Railroad Officers," in September, last year. As the Committee were men whose names stand high as managers and workers, therefore it is with a certain amount of awe that I venture to criticize the best efforts of a Harris, a Winslow and a Merriitt. That the code referred to was the best effort of the Committee is evident from the remark made by the Chairman in his letter to the Board: "They are happy to believe that they have succeeded, with the faithful and laborious co-operation of the Commissioners, in framing a code which will accomplish ALL THAT HUMAN FORESIGHT CAN SUGGEST in making the immense amount of travel upon these thronged highways of our people as safe as the lot of humanity will admit." No modest statement this. How does their handiwork bear it out?

First, let us inquire whether the code was a synopsis of principles, intended only as a guide to managers in framing the rules for their respective roads. The code is headed "Rules and Regulations," and opens with the announcement that "a perfect familiarity with the following rules, as well as with the special regulations which may accompany the time-table regulating the current operation of the road, will be expected of all employees of the company, and an ignorance of their requirements will never be received as an excuse for not obeying them." From this declaration it is evident that the code is no abstract of general principles, but is intended as a detailed guide for all employees.

Now let us examine the rules:

(a) 1. GENERAL SIGNALS.—A single short whistle from the engine is a signal to "apply" the brakes, and should be promptly obeyed by all whose duty it is to apply them.

Two short whistles, a signal to "let go" brakes.

Three, to "back the train."

Four, to "call in flagmen."

If the bell-cord be attached to the whistle, as it usually or very often is, and the train break in two, the result is a single short whistle caused by the tug before the rope breaks. According to the rule the engine-man puts on the brake and stops; the rear part of the train not being under control runs on and collides with the other part. One short whistle is therefore not a good signal to "apply brakes." Two whistles would be better.

Sometimes the engine becomes so disabled that it can drag the train at a very slow rate only, either into the next station or for some considerable distance before it comes to a stand. The engine-man, hoping to make the next station and knowing that he could not start again, is unwilling to stop; yet he knows that his train proceeding so slowly is in danger of being run into by a following train. In such circumstances a signal man should be dropped as soon as the train begins to move so slowly that there is danger of collision; but there should also be a "disabled signal" sounded at intervals and when the "follower" appears in sight, so that the engine-man of the approaching train may slacken in time. It may also happen for some other reason that the engine-man of a leading train may desire the following one to slacken, and yet not wish brakes applied on his own. The rules do not provide for such contingencies.

When a train is being flagged, the "flag train" should call attention to that fact, when entering stations, passing highways, section men at work in large gangs, etc. It is particularly necessary when trains are to be met at stations, so that the opposing train-men may not start and that the station people may provide accommodation. The flag cannot always, in fact can seldom, be seen soon enough from the station, and may be overlooked by train-men. Also a train off time in a way-aiding may wish to be flagged on to the next telegraph station by a passing train which does not stop, and so must

communicate that wish by signal. All well-ordered roads have whistle signals for these purposes; but the Committee have not thought of them.

(a) 2. "The whistle must always be sounded or the bell rung eighty rods before reaching a public highway crossing. Regular trains, on time, may sound the whistle briefly at crossings, but irregular trains, and those out of time, should sound a long whistle."

Why this distinction at "public highway crossings" between regular and irregular and those out of time? The public cannot be expected to know when the trains are due, and the gate-keeper, if any, is expected to be on the alert all the time. The distinction is unnecessary, and therefore the code should not be burdened with it.

(a) 4. "A red lantern must be displayed by night at the rear of every passenger train, as a signal to all following trains. A red flag by day and a red lantern at night must be displayed on the rear car of every freight train, and in such a position as to be seen from the engine and by any approaching train."

Here there is no attempt to establish uniformity as regards the position of the lights. It is desirable that the engine-man of a following train should be able to distinguish whether it is a "passenger" or a "freight" that is before him. The position of the light is usually the guide, the "passenger" light being low, down on the platform level, and the "freight" light high up on the side of the van. But the wording of the rule permits the placing of both lights on the same level, so that no distinction can be observed. Moreover, I think the plan of having only one red light in rear of train a bad one, as when the train is in the siding the light might easily be mistaken for a switch or hand lamp. Again, may the light be placed on either side of the rear car, at option of the brakeman, or should it always be on the same side? The last sentence in the rule—"and by any approaching train"—does not convey the meaning of the Committee. The word *any*, applies to a train approaching from the front as well as to one approaching from behind; but the Committee do not, I suppose, intend that the light must be so placed as to be visible to trains approaching from both directions. If they do, it must be placed on top of the rear car, some distance above the roof, for side lights are not ordinarily visible to trains in front. At any rate, there is an ambiguity in the wording of the rule that should not be.

(a) 8. "Every passenger train should be supplied with not less than two red lanterns, and every freight train with not less than four. In case of accident or unusual delay at night one or more red lights should be sent in the direction of any approaching train to signal it to stop."

This is a wonderful piece of wisdom. Are the lanterns extra ones, or does the number include those that are shown according to section 4? Why a distinction between passenger and freight trains; does it not take as many lights to guard one as the other? When there is an accident and the train has come to a stand, is the sending out of lights to be delayed until some train is approaching? The rule says as much. Instead of providing that the train is to be at once protected in both directions, that one or more red lights should be sent in "the direction of any approaching train." Why one or more? It seems strange that the Massachusetts officers have not been more careful in regard to this rule after their sad experience. What is meant by "in case of accident or unusual delay." Loss of time on road, owing to some derangement of engine, although the train did not come to a stand would be unusual delay. Under such circumstances would it be necessary to send lights out? What about day signals? Are lights to be sent out then, or is there any other arrangement? The rules are silent upon this point.

(a) 5. "A red flag by day and a red lantern by night, displayed from the engine, is a signal that another engine or train is to follow."

Displayed from what part of the engine? May the engine-man stick it out anywhere? Does this signal give the "follower" any particular right? The rules do not say so anywhere.

(a) 9. "Torpedoes must be used in addition to flags or lanterns, whenever, in case of accident or delay, there is any liability that the signal-flag or lantern may not be seen, by reason of fog, or otherwise. Engine-men, station-agents and section-firemen should always be supplied with them. When a torpedo is exploded by an engine passing over it, the train must be stopped immediately."

For the sake of humanity in general and railroad corporations in particular, I trust that "human foresight" can suggest some better rule than this for the use of torpedoes, the Committee notwithstanding. The rule of the Vandalia Line is much more like the highest effort of "human foresight" than the vaunted one of Massachusetts. It is as follows:

"Six torpedoes will be furnished to each conductor and engineer, to be used in stormy and foggy weather, in addition to the ordinary danger signals."

"When a train is detained on the main track, at such times—from any cause whatsoever—it shall be the duty of the conductor to send a flagman with three torpedoes, in the direction of the expected train, who shall go at least the distance of 80 rods and fasten a torpedo to the track, and then proceed and fasten the other two at intervals of 20 rods beyond the first."

"If he should be recalled by the 'return signal' (four blasts of the whistle) before the expected train comes within hearing, he shall leave the torpedo last laid and take up the other two and return with all possible dispatch to his own train."

"An extra engine detained on the main track, in like circumstances, must be protected by the engineer sending his fireman with torpedoes in the same manner as above."

"Whenever an engine explodes a torpedo, the engineer must shut off steam and give the brake signal, and if three torpedoes are exploded he must reverse his engine, use sand, and stop his train as soon as possible."

"Whenever torpedoes have been used, application must be immediately made to the General Superintendent or Division Superintendent for a full supply, and conductors and engineers are expected to know that they have them on hand and ready for constant use."

"Torpedoes are fastened to the track by bending open the two tongs, placing the box on the rail with label up, and bending the tongs around the head of the rail."

"The use of these signals is to be in addition to the regular day and night signals of the road, which must also be exhibited."

The Massachusetts rules do not declare who is responsible for seeing the torpedoes placed, nor the number which should be laid down, nor do they direct a supply to be kept constantly on hand, and amongst those who should keep them on hand con

ductors are not mentioned. The Vandalia rules, though much fuller, are not perfect. They provide that it shall be the duty of the conductor to send torpedoes "in the direction of the expected train." In time of accident the attendant excitement is likely to prevent those concerned from remembering that a train is due, and moreover a train may come along that they do not expect. The rule should be made absolute and invariable, trusting as little as possible to memory and presence of mind. It might read as follows:

As soon as the engineman of a train on the main track finds that he cannot proceed faster than five miles per hour he must notify the conductor to drop a signalman to warn following trains. The signalman will remain where put down until the next train comes along, which he will stop, and then get upon its engine, explaining the circumstances to driver. The engineman of disabled train will sound the prescribed whistle at intervals of about five minutes, and continuously after a train appears in sight, until replied to by the engineman of that train. As soon as a train on the main track, from accident or otherwise, comes to a stand, except in the course of shunting at stations where properly protected by station signals, or at water stations, the conductor will send a fireman in advance and a brakeman to the rear with flags and 3 torpedoes. Each signalman will proceed not less than 80 rails from the train and lay one torpedo, then lay the other two at intervals of 20 rails, and stay, showing his flag, close to the torpedo farthest from the train. These men are to be sent out at the earliest possible moment after the train has stopped, whether other trains are expected or not. If the men mentioned are from injury unable to go out, the conductor will send two men selected from the passengers or other persons near by, instructing them and so far as possible watching them until in their places. The conductor must give his particular attention to the rear of his train, and see that the signalman goes out far enough to give a following train time to pull up. When recalled, the man in advance will take up all his torpedoes, but the signalman protecting the rear will leave the torpedo farthest from the train in its place, and taking up the other two will return to his train.

There is another matter connected with torpedoes that both the Massachusetts and the Vandalia rules ignore, viz.: the fact that old torpedoes are liable to miss fire. At fixed periods all torpedoes should be brought in and a fresh issue made. The ones brought in can then be tested by taking one or two at random. If any prove bad the whole lot of that issue should be condemned. This overhauling of torpedoes is useful in two ways, as it not only insures the efficiency of the article when required for use, but it impresses on the minds of those having them in charge the importance attached to them and of keeping them in order and ready for emergency. HINDOO.

[TO BE CONTINUED.]

Fastening Crown-Bars.

TO THE EDITOR OF THE RAILROAD GAZETTE:

In reply to "de S.": I have charge of 94 engines. Seventy-two of them are first-class standard Baldwin locomotives. None of them have the crown-bars attached as shown in the *National Car-Builder* or *RAILROAD GAZETTE*. Some of our Baldwin locomotives have the crown-bar bolts screwed through the crown-sheet, but not screwed through both the crown-bars and crown-sheet, and washers left off. The "Illustrated Catalogue of the Baldwin Locomotive Works," page 131, explains the manner in which the crown-bars are attached to the crown-sheet in the standard engine of that form. L. H. WAUGH.

Master Mechanics' Association's Circulars.

The following circulars have been issued by committees of the Association:

SAFETY CHAINS.

DEAR SIR: The Committee appointed by the American Railway Master Mechanics' Association on the subject of "The Efficiency of Check or Safety Chains on Engine, Tender and Car Trucks, in Lessening the Danger Resulting from Running Off the Track," would respectfully solicit your opinion on this subject, and we present below some interrogations for your consideration. Yet we desire you will not be confined entirely to them in your answers, but will give us such matters of information as will be calculated to bring out the facts as to whether safety chains can be so applied that their efficiency may, on the whole, warrant the expenditure in their application to all engine, tender and car trucks, and their maintenance in a condition to be entirely reliable under all ordinary circumstances, when subjected to such strains as may be brought upon them in case of accidents:

1st. Do you consider it practicable to apply safety chains and their fastenings, of sufficient strength to all classes of trucks, so as to be entirely reliable, and would their efficiency and certainty in lessening danger in case of accidents, warrant the cost of application and maintenance in good condition thereafter?

2d. What should be the diameter of the iron composing the links of safety chains to engine trucks, and what for chains to tender and car trucks, and what should be the length of the links of chains to each class of trucks?

3d. Should the point of attachment of the chain to the frame of engine, tender or car be as directly over where it is attached to the truck as practicable, with but sufficient length of chain to permit the ordinary movements of the truck while on the track, or should the chain be fastened diagonally from the points of attachment and in the direction of the strain brought upon it in preventing the truck from turning, or assuming a position to go off at a tangent from the direction of the rails, in case of running off the track?

4th. Should all trucks have safety chains attached to each of the four corners, or do you deem two chains sufficient for each engine and tender truck?

5th. Do you know of any instances where the use of safety chains prevented serious damage or destruction of life or property?

6th. Is it your opinion that, as a means of safety, air center pins and king bolts of engine, tender and car trucks should, in all cases, be securely keyed, so as to prevent the center-pins from being drawn out of their places and to hold the trucks in their place, under all circumstances?

R. WELLS,

Master Mechanic Jeffersonville, Madison & Indianapolis Railroad.

CHAS. R. PEDDLE,

Superintendent Motive Power Terre Haute & Indianapolis Railroad.

J. L. WHITE,

Master Mechanic Evansville & Crawfordville Railroad.

Please address replies to R. Wells, Jeffersonville, Madison & Indianapolis Railroad, Jeffersonville, Ind.

STEEL TIRES, WHEELS AND AXLES.

The undersigned, a Committee of the American Railway Master Mechanics' Association, to whom was referred the subject of "Steel Tires, Wheels and Axles, also Chilled Tires," respectfully call your attention to the accompanying series of questions, and solicit such information as you may be able to furnish on the topics therein embraced.

It is obvious that to enable the Committee to present a report which shall possess any real value they need to have before them statements from as many sources as possible, and that these be as full and accurate as practicable.

The Committee hope you will promptly favor them with replies to their interrogatories as complete and definite as possible. In respect to circumstances of breakage or removal of tire they especially desire full information.

With this is sent a form for heading of statistical blanks, which is recommended as presenting the facts sought for in a shape satisfactory and convenient for the purpose of the Committee.

As it is desirable that the details of the performance of tires, etc., should be brought up to a uniform date, we suggest the first of March as that date, and hope to receive the reports during that month.

Questions Relating to Steel Tires.

1. How many steel tires, and of what manufacture, are in use on your road?

2. Please furnish a detailed report of the performance of each set, stating the number of the set, thickness when fitted for use, present thickness, mileage, diameter of wheel, weight of engine and nature of service.

3. Have any steel tires broken while in use on your road?

4. Please furnish statement of circumstances attendant upon such breakage: as, the season of the year, the mode in which the tire was secured, the amount of shrinkage when set, the nature of the fracture, and extent of the damage in consequence thereof.

5. Have any steel tires on your road been removed from wheels, on account of being worn so thin as to be considered unsafe? If so, of what thickness were said tires when removed, and what indications caused you to doubt their safety?

6. Is the location of your road such as to make your tire service particularly severe, on account of heavy grades or extremely cold weather?

7. What do you consider the best method of fastening steel tires to the wheels, and what rate of shrinkage do you allow in setting?

Chilled Tires.

8. How many chilled tires, and of what manufacture, have you in use on your road?

9. Please furnish detailed report of the performance of each set, mileage, diameter of wheel, weight of engine, and nature of service.

Wheels.

10. How many steel wheels, and of what manufacture, are in use on your road, under engines or cars?

11. In your experience, how do steel wheels compare with those of iron, in point of durability, safety and economy?

Axes.

12. How many steel axes, and of what manufacture, are in use on your road, under engines or cars?

13. From your own experience, do you think that their greater durability and safety, as compared with those of iron, would justify the difference in cost?

Yours, respectfully,

J. N. LAUDER,

Northern (N. H.) Railroad,

F. A. WAITE,

Boston & Maine Railroad,

G. H. GRIGGS,

Flushing & North Shore Railroad,

Please address your reply to James N. Lauder, Northern (N. H.) Railroad, Concord, N. H.

Western and Southern Railway Association.

This Association has issued the following circular:

The annual meeting of this Association will be called to order at 11 a. m., on Tuesday, January 14, 1873, in the Southern Hotel, St. Louis, parlor No. 5.

The business before the convention will be:

First. Annual report for 1872.

Second. Election of officers for 1873.

Third. Amendment to the constitution, making the Association "National," and limiting its meetings to two yearly.

Fourth. Reports to be read, from committees, as follows:

1st. Organization of a National Railway Telegraph Company, if, after a careful examination it should be found necessary.—E. G. Barney, General Superintendent Selma, Rome & Dalton Railroad; A. A. Talmage, General Superintendent Atlantic & Pacific Railroad; General J. H. Hammond, Vice-President Macon & Brunswick Railroad.

2d. On the Best Method of Dispatching Trains by Telegraph.—A. A. Talmage, General Superintendent Atlantic & Pacific Railroad; J. E. Gimperling, General Superintendent Indianapolis, Bloomington & Western Railway; Colonel A. Anderson, Vice-President Toledo, Wabash & Western Railway.

3d. The Adoption of a Uniform System of National Time for Working Time Tables.—Robert Harris, General Superintendent Chicago, Burlington & Quincy Railroad; E. G. Barney, General Superintendent Selma, Rome & Dalton Railroad; J. F. Boyd, General Superintendent St. Louis & Southeastern Railway.

4th. Relation of Railways to Express Freight Lines and their Management.—Hon. Joseph E. Brown, President Western & Atlantic Railroad of Georgia; Colonel A. Anderson, Vice-President Toledo, Wabash & Western Railway; Horace Scott, General Superintendent Jeffersonville, Madison & Indianapolis Railroad.

5th. Sleeping Car Contracts, and Repairs of such Cars.—M. Hughtitt, Gen'l Supt Chicago & Northwestern Railway; L. P. Grant, Gen'l Supt Atlanta & West Point Railroad; A. Mitchell, Gen'l Supt Illinois Central Railroad.

6th. The Best Methods of Heating and Lighting Cars.—O. Chanute, Gen'l Supt Leavenworth, Lawrence & Galveston Railroad; A. W. Soper, Gen'l Supt St. Louis & Iron Mountain Railroad; W. K. Muir, Gen'l Supt Great Western Railway of Canada.

7th. Proper Rules and Charges to be Adopted for Demurrage in the Interchange of Freight Cars, and Delays in their Return. How Shall these Charges be Apportioned, when Foreign Cars run over Several Connecting Lines?—Geo. H. Nettleton, Gen'l Supt Atchison, Topeka & Santa Fe Railroad; E. W. Cole, Pres't Nashville & Northwestern Railroad; A. N. Chrystie, Vice-Pres't Ohio & Mississippi Railroad.

8th. The Best Material for the Construction of Cars.—Gen. J. H. Hammond, Vice-Pres't Macon & Brunswick Railroad; Robert Harris, Gen'l Supt Chicago, Burlington & Quincy Railroad; W. C. Van Horn, Gen'l Supt St. Louis, Kansas City & Northern Railroad.

9th. An Inquiry into the Cost of Transportation of Mail and Postal Cars, to Ascertain the Basis on which the Post Office Department arranges Compensation for the Service Rendered by Different Railroad Companies, and whether that Basis is a Proper one, and if not, to Suggest a Proper Basis.—A. Fink, Vice-Pres't & Gen'l Supt Louisville & Nashville Railroad; O. Chanute, Gen'l Supt Leavenworth, Lawrence & Galveston Railroad; A. Mitchell, Gen'l Supt Illinois Central Railroad.

10th. Uniform System of Signals.—Major John E. Simpson, General Superintendent Vandalia Line; A. W. Soper, General Superintendent St. Louis & Iron Mountain Railroad; Captain E. G. Barney, General Superintendent Selma, Rome & Dalton Railroad.

A full attendance is earnestly requested, as matters of importance will be discussed. Under Article 3, of the constitution,

those officers unable to be present can send a delegate "duly accredited and authorized;" but, as much of the value of the debates and transactions of the Association arises from the information imparted by personal intercourse it is hoped that members will attend the meetings in person as often as possible.

By order of the Executive Committee.

HARRY E. SHARPE,
Corresponding Secretary.

St. Louis, Mo., December 1, 1872.

EXTRACTS FROM CONSTITUTION.

ARTICLE II. The Association shall be composed only of presidents, general managers, general superintendents, or other officers in charge of the operating of railways.

ART. III. No person, other than the officers named in Article second, shall be permitted to sit as a member of this Association or participate in its deliberations, unless duly accredited and authorized by his principal, and the company represented by him shall be bound by the action of the Association, as hereinafter provided.

ART. IV. The object and purpose of this Association shall be the promotion and advancement of railway interests, by an interchange of views and ideas and by the comparing of experiences, thereby securing greater efficiency and economy in their operation; and for the adoption of such rules and regulations as will most fully carry out the purposes herein expressed.

ART. VIII. Sec. 3. It shall be the duty of the Secretary to keep correct minutes of the proceedings of each meeting, and to publish the same immediately after the adjournment thereof, sending a copy to each member of the Association.

ART. IX. Before the close of each regular meeting, the President shall call for the presentation of such subject as any member may desire to have considered at the next meeting, which shall be entered upon record, and the Secretary shall embody the same in his notice to each member of the holding of such meeting.

ART. XI. Any railway officer named in article second shall be considered a member of this Association, upon signing the constitution or upon his written request addressed to the Secretary, directing his name to be affixed thereto.

ART. XII. In the decision of all questions by the Association each railway represented shall be entitled to but one vote.

BY-LAW.

ARTICLE III. Every member of this Association, present at any meeting thereof, shall be bound by its action on all pertinent questions discussed and decided by it, unless he shall give notice of his dissent to the Association before the adjournment of the meeting at which such action is taken. Absent members shall notify the Secretary of their dissent in writing fifteen days after receipt of notice of the action of the meeting.

New York & Harlem Railroad Report.

The report of this company for the year ending September 30, 1872, shows that it has a main line 130½ miles long, from New York north to Chatham Four Corners, with 45½ miles of double track; that it owns branches 4½ miles long, and a leased branch (to Lake Mahopac) 7 miles long, with 2 miles of double track. It owned at the close of the year 41 locomotives, 70 first-class coaches, 38 baggage, mail and express cars, and 749 freight cars. It owns also 116 street cars for its horse railroad.

This property was represented by \$9,000,000 of capital stock paid in (\$500,000 more than by the last preceding report), a funded debt of \$1,864,024 (bearing an average interest of 6½ per cent.), and a floating debt of \$1,135,000; besides real-estate mortgages for \$435,375. The funded debt is \$109,201 less and the floating debt \$385,000 more than by the previous report.

As the company owns 135 miles of road, nearly, the capital stock is at the rate of \$66,666 per mile; the funded debt, \$36,030; the floating debt, \$8,407, and the debt secured by real estate, \$3,225; the total account per mile being \$111,323, and the gross amount of stock and debts \$15,434,399.

The construction account for the road amounts to \$11,840,447; motive power, etc., \$156,345; cars, \$1,032,665; horses and stables, \$120,125. The equipment thus represents \$11,000 per mile. But this cost of road does not include the section from Dover Plains to Chatham Four Corners, which is represented by two millions of "Albany Extension certificates," \$1,903,500 of which is held by the company. And the company holds real estate not included in this account estimated at \$1,445,230.

The earnings of the road were:

	1872.	1871.
Passengers.....	\$1,110,195.87	\$1,062,237.96
Freight.....	1,238,811.53	1,210,931.53
Other sources.....	432,437.34	425,444.34
Total.....	\$2,850,524.79	\$2,698,762.96

or \$20,116 per mile of road worked. The earnings for the previous year were \$2,698,762.96, and the increase is about 5½ per cent.

The working expenses were:

Maintenance of road.....	\$318,913.27
Maintenance of equipment.....	335,653.54
Conducting traffic, etc.....	665,616.81
Total.....	\$1,319,983.63

which is 60 per cent. of the gross receipts, and \$92,933.82 more than for the previous year.

The net earnings, \$1,137,141.17, were absorbed by

Interest.....	\$359,038.72
Two per cent. dividends.....	729,430.77
New depots, bridges, etc.....	14,877.63
Total.....	\$1,137,141.17

Among the miscellaneous receipts is \$258,975.23 from the New York & New Haven Railroad Company, for the use of the 14½ miles of road from Williams' Bridge to New York.

During the year passenger trains ran 416,320 miles and freight trains 397,895, on the road by steam, and passenger trains 796 miles, and freight trains (cars rather) 31,983 miles, drawn by horses. The number of passengers carried was 1,640,875—379,427 being commuters. The number of passengers carried one mile was 23,183,146, 4,685,150 being commuters. 21,039,166 tons of freight were carried. There were besides 8,770,666 passengers carried in city cars, and these cars ran 1,407,334 miles. Also New Haven trains ran 168,975 miles over the road by steam, and 109,049 miles by horses.

During the year 19 persons were killed and 17 injured on the road. Of those one of the killed and one of the wounded only were passengers; three of the killed and five of the wounded were employees, and the rest other persons—chiefly persons who were on the track when hurt.



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Editorial Announcements.

Correspondence.—We cordially invite the co-operation of the railroad public in affording us the material for a thorough and worthy railroad paper. Railroad news, annual reports, notices of appointments, resignations, etc., and information concerning improvements will be gratefully received. We make it our business to inform the public concerning the progress of new lines, and are always glad to receive news of them.

Inventions.—No charge is made for publishing descriptions of what we consider important and interesting improvements in railroad machinery, rolling stock, etc.; but when engravings are necessary the inventor must supply them.

Articles.—We desire articles relating to railroads, and, if acceptable, will pay liberally for them. Articles concerning railroad management, engineering, rolling stock and machinery, by men practically acquainted with these subjects, are especially desired.

Advertisements.—We wish it distinctly understood that we will entertain no proposition to publish anything in this journal for pay, except in the advertising columns. We give in our editorial columns our own opinions, and those only, and in our news columns present only such matter as we consider interesting and important to our readers. Those who wish to recommend their inventions, machinery, supplies, financial schemes, etc., to our readers can do so fully in our advertising columns, but it is useless to ask us to recommend them editorially, either for money or in consideration of advertising patronage.

THE AMERICAN SOCIETY OF CIVIL ENGINEERS.

This Society was organized in November, 1852, by a number of civil engineers and architects, nearly all of whom were residents of New York city. The minutes of the Society show that it continued in more or less active existence until 1855. From that year to October 2, 1867, there is no record of any meetings, and in the minutes of the latter date it is stated that the last meeting was held March 2, 1855, so that the Society must have existed, if at all, in a comatose state for nearly twelve years. This inference is confirmed by a statement of the President made at the meeting of October 2, 1867, and recorded in the minutes, that the object of the meeting was to "resuscitate" the Society. On that occasion a committee was appointed "charged with the duty of preparing a plan for the revival of the meetings—said plan to be so arranged as not to call for an expenditure of more than \$1,200 for the coming year." That committee at a subsequent meeting made a report, and on November 6, 1867, the first meeting was held in their present rooms at No. 63 William street, at the corner of Cedar street. These rooms have been occupied by the Society ever since. They are in the third story and consist of two apartments, one of them 13 by 24 feet, and the other 16 by 24. They are comfortably furnished with conveniences for writing, book case, etc., and are opened to members six days of the week from 9 a. m. to 4 p. m. Regular meetings of the Society are held on the first and third Wednesdays of each month; the one at 1 o'clock and the other at 8 p. m. At these meetings the regular business of the Society is transacted, and papers on engineering are read and discussed. The membership now numbers nearly three hundred, and among them are many of the most eminent engineers of the country.

Papers, after they are read, are submitted to the Committee on the Library, who determine which shall be printed. Copies of those that are published are sent to the members, with an abstract of the discussion thereon. Up to the present time fifty-four have been printed, and a considerable number are now in the hands of the Publication Committee. Among these papers are, we believe, many of the most valuable contributions which have thus far been made to engineering literature in this

country, and a steady improvement is obvious each year in their character.

"The persons who are eligible for membership," to quote from the constitution of the Society, "are civil, military, geological, mining and mechanical engineers, architects and other persons, who, by profession, are interested in the advancement of science. They must have been in the actual practice of their professions for at least seven years, and have been in charge of work or of operations in their particular branch of engineering or of science. A diploma from any collegiate institution in good standing, conferring the degree of C. E., will be considered equivalent to two years' service."

The limitations of membership, it will be seen, are quite general, and might include many whose professions have nothing whatever to do with engineering. In fact, great difference of opinion exists among the members regarding the qualifications which should be required for membership, and as three dissenting votes will defeat the election of a candidate, it is somewhat of a risk for a person without considerable experience as an engineer to submit his name for election.

As the term *civil engineer* was used originally in contradistinction to *military engineer*, and modern usage has applied the former term almost exclusively to persons who are engaged in the construction of fixed public works, and *mechanical engineer* to those who design machinery, it seems a misnomer to call an association whose constitution by express provision makes "civil, military, geological, mining and mechanical engineers and architects" eligible for membership, a Society of *Civil Engineers*. If the word "civil" were struck out of the title, it would be more in accordance with actual facts, and give the organization a better chance of becoming what it should ultimately be, a national society of engineers.

Its members are now scattered over the whole country, and are engaged in every variety of work. They are to be found in almost every State of the Union, and are or have been represented on many of our most important public works which are either completed or in progress.

The objects of the Society, as stated in Article II. of the Constitution, are: "The professional improvement of its members, the encouragement of social intercourse among men of practical science, the advancement of engineering in its several branches, and the establishment of a central point of reference and union for its members." Article III. states that "the means to be employed for attaining these ends shall be periodical meetings for the reading of professional papers and the discussion of scientific subjects; the foundation of a library, the collection of maps, drawings and models, and the publication of such parts of the proceedings as may be deemed expedient." In accordance with this plan, the semi-monthly meetings before referred to are held in the rooms of the Society. At these meetings the regular business is transacted, papers are read and discussed, and social intercourse is "encouraged." Besides these meetings, there is the annual convention, to which several days are usually devoted. This promises to become a much more important event than it has been heretofore. As the membership is extended and scattered over greater distances, it becomes more difficult for them to attend the ordinary meetings, and, consequently, to make the annual convention an occasion of a general reunion. At the last there was a larger attendance than ever before, and papers of more than ordinary interest were then read and discussed.

The Society also has the nucleus of an engineering library, which is constantly increasing by donations, but is still sadly deficient. The rooms have become a favorite place for members to meet each other, and each month are frequented more and more.

There is, however, a feeling, which we believe is quite general among members, that for some reason the Society is not accomplishing what it should and ought. This was expressed at the last annual convention by Mr. Charles Paine in some remarks by which he introduced a resolution "that a committee of five be appointed, consisting of two members from the West and three from the East, to consider the best means of promoting intercourse between the Society and its members, and the subject of allied societies or chapters, and to report such changes of the constitution and by-laws as may be necessary to effect the objects contemplated." In presenting this resolution, which was adopted, Mr. Paine remarked that "the Western members of the Society have long desired that their intercourse should be more frequent and intimate with it, and their correspondence full and constant; that they should, in fact, be a part and not an appendage of the Society. I and many of us here, at the West, have given the matter serious consideration. This Society should become a national one, and maintain a rapid, steady and complete intercourse with all its members." Mr. E. S. Chesbrough, Mr. Octave Chanute, Mr. Thomas C. Clarke, Mr. Horatio Allen and Mr. Wm. P. Shinn were appointed a committee to consider and report upon the subject.

It will thus be seen that the Society has the matter fairly before it, and some consideration of it will therefore be appropriate at the present time.

The difficulty with the Society now seems to be, that there is no system of communication between it and its members. The only intercourse which now exists is the sending and receipt of notices of meetings and printed copies of papers and discussions. It is quite impossible for a large majority of the non-resident members to attend the semi-monthly meetings, and with the exception of those papers which are read and printed, they have little knowledge of the proceedings of the Society. Quite naturally, therefore, they lose interest in it and take no part in its proceedings.

Now the chief object of all societies of this kind is the formation of a central point to which each member may contribute of his own knowledge and experience for the benefit of all. Therefore, the first consideration should be, how to secure the greatest amount of information from members, and from other sources; and, second, how to make this knowledge most easily available to those who want to use it.

The plan at present pursued is to have members prepare and read papers on subjects about which they are supposed to be specially informed. Engineers who have been engaged in a work of more than ordinary interest, who have experimented in some special process or investigated peculiar phenomena of interest to engineers, will communicate their information by means of a descriptive paper, which is read and then discussed at one or more of the meetings of the Society. Now undoubtedly this plan is very effective in communicating information regarding a special class of subjects. When a person has some experience or knowledge concerning a subject with which no one else is acquainted, such as the construction of some special work, then the simplest and most direct way to convey the information thus gained is to write an account of it. As an example, we will refer to the sinking of the East River Bridge piers or the plans and progress of the Detroit River Tunnel. In such cases an engineer has special opportunities for observation, and is obliged himself to provide the means to overcome the difficulties in accomplishing the work done.

There is, however, another class of subjects about which information is constantly needed, and concerning which numbers of engineers and others have opportunities of gaining experience and observing the effects of either well or imperfectly known causes. To this class the subject of the wear, strength and weight of rails belongs, endurance of bridges, methods of laying foundations, etc. Concerning subjects of this kind it is important to get the experience of the largest number of people, and under the greatest variety of circumstances. With the present method of conducting business in the Society of Civil Engineers, there is no efficient means of doing so. This is the more remarkable, as several kindred societies now have a system of collecting information in successful operation, which, if adopted by the Society of Civil Engineers, would, we believe, succeed not only in accumulating the results of the experience of others concerning subjects about which information is needed, but also would have the effect of bringing the Society and its members into frequent communication with each other, and induce many to study and investigate subjects which are brought before it who now seldom give them a thought. We refer to the plan adopted by the American Railway Master Mechanics' Association. This Society has no local habitation, but holds an annual session or convention which continues through three or four days. At these meetings subjects which have been presented for consideration are reported upon and discussed by all the members who may feel inclined to take part. In order to bring a subject before the Association for consideration, any member can move that a committee be appointed to investigate and report at the following annual meeting. If the Society concurs with the mover of the resolution, a committee is appointed by the chairman, if no names are submitted by the motion. The committee, after the convention adjourns, prepares a series of questions, referring to the subject under consideration. These questions are printed and sent to each member, and he is expected to send replies to them. After they are received the committee prepares a report, which is read and discussed at the next annual convention.

This plan works well in several different ways. In the first place, if the selection of the committee is a good one, it will after careful consideration propound a series of questions which of themselves will direct inquiry into the channels most likely to be productive of knowledge. In the next place, the questions will induce the persons to whom they are addressed to engage in investigations and inquiries, which otherwise would not have suggested themselves. Thirdly, the receipt of a circular from the Society requesting certain specific information has a tendency at once to interest the recipient in the proceedings of the Association. Fourthly, the replies to the

questions presented by the committee will enable its members to make a report embodying all the information thus acquired, which will give it a value it could not have had if it were only the expression of the opinions of one or a few individuals. Fifthly, in replying to questions which are skillfully and intelligently prepared, anyone will almost necessarily be obliged to learn more about the subject, and understand it better, than before giving such answers. In many and probably most cases, the persons who do so will undertake some careful investigation or experiment relating to the subject presented for consideration. The result of this will be that members will come to the meeting and to the consideration of the report of the committee with more or less special information concerning it, and after ample time has been allowed for careful consideration. When a paper is now read before the Society of Civil Engineers, it is usually presented with little or no preliminary announcement, and members listen and afterwards discuss it without any special preparation or knowledge. Often the subject treated of is of such a character that it is impossible to fully comprehend what is written about it by simply hearing it read.

The system which we have described has worked admirably well in the Master Mechanics' Association, where it has been employed for four or five years. Copies of all the circulars issued are reprinted in the pages of the RAILROAD GAZETTE, so that our readers are somewhat familiar with them. In skillful hands we believe the system is capable of much greater usefulness than it has yet achieved in the Association to which we have referred. If the Civil Engineers' Society should adopt this plan, it will by no means be necessary to abandon its present method of conducting business. It will doubtless always be desirable to have members give descriptions of their work and experience, but in connection therewith it would, we believe, increase the usefulness of the Society and also the interest felt by the members, if they were to adopt the plan so successfully employed by the Master Mechanics' Association.

The advantages which would result from the formation of local societies or "chapters," as is proposed, are not so apparent, nor is it quite clear to us what good purpose they would serve, or rather what advantages would result from a federal organization. It is quite true that it is entirely out of the question for members who live in San Francisco to attend the semi-monthly meetings in New York, and if there are a dozen members in that far Western city, they might find it desirable to meet together there, and hold discussions for their mutual edification. It is hard to see, however, why a license from a society which is intended to be national and not local in its character, should be necessary or an advantage in any way whatsoever to the brethren on the Pacific coast in holding such meetings, nor how the central society would be benefited by a merely nominal connection with such an association. That the relation would be anything more than nominal seems very improbable, and we do not know that anything more has thus far been proposed.

It is said that now the expenses of the Society are paid by all the members, resident and non-resident in New York, and that the advantages therefrom accrue chiefly to the resident members. This, if true, might indicate that the dues of the one class should be increased, or those of the other diminished, or possibly both. It is difficult to see, however, how, if the members in San Francisco do not get their full share of the advantages resulting from the maintenance of the rooms and meetings in New York, the matter would be equalized any better by authorizing them to hold meetings themselves nearer to the Golden Gate. The organization of local societies may be, and probably would be, very useful and desirable for many reasons, but why they should be united with the present Society is not so clear. With a large non-resident membership, it seems probable that some different system of conducting business must be adopted from that which prevailed when nearly all the members resided either in New York or not far from it. The change required is, we believe, to give more time and assign more importance to the annual conventions and annual meetings, and to conduct the business more by correspondence and postal intercourse with members. This change is gradually being effected by the necessities of the somewhat changed relation which the members bear to the Society. It may, however, be well to recognize it, so that ample provision may be made for the new condition of things.

Before discussing the subject of local societies, it may be well to call attention to what, it is conceived, might and probably would be a source of embarrassment and trouble to the central Society, if the federal system were adopted. We refer to the qualifications of membership in the local bodies. At the present time the whole sub-

ject is left very much to the judgment of the board of managers and to the members present at the meetings to which the names of candidates are submitted. Now, if all the members of the local societies had to be elected by the parent association, then the only difference between such an organization and the present would be, that it would simply be granting to some members the authority to hold local meetings, which they can do now without authority. If, on the other hand, the local bodies should decide who shall and who shall not become members, then it seems extremely probable that very many would be admitted who could not be elected if their names were submitted to a meeting at No. 63 William street. The professional standard for engineers is low enough in New York, but is probably much lower in Skowhegan or some other comparatively obscure place. In order to get a respectable membership in such places, it would be necessary to admit many who would not be up to the standard which a national society of engineers should require. This, we fear, would be a perpetual source of embarrassment and might result in more evil than good.

It is true that much good might result if non-resident members would form local associations for purely local purposes, and make the connection with them the preliminary step to membership with the New York or national Society. If such were organized for the special advantage of the younger engineers and students, they would supply material from which the membership of the present Society could constantly be recruited, and which is absolutely necessary for the growth and prosperity of any organization. This could, however, all be accomplished without any federal organization, and with much less embarrassment to all parties concerned. After all, the success of any such movement will depend more upon the interest and skill of the non-resident members than upon any ingeniously devised scheme or system which might be adopted and issued by the existing organization.

Altogether it seems that the usefulness of the Society would be promoted much more by the adoption, to a certain extent at least, of the method of doing business employed by the Master Mechanics' Association than by the organization of chapters. The former plan could be tried to a limited extent, at least, without any constitutional changes, and if not successful could be abandoned without embarrassment; whereas any federal organization will involve very important changes, and if once a step is taken in that direction there will be more difficulty in retracting it than there was originally in its adoption.

Record of Track Increase.

In this number of the RAILROAD GAZETTE we give information of the construction of the following sections of new railroad:

Pennsylvania Petroleum, track laid (the first) from Pithole to Petroleum Center, Pa., 6 miles. *Buffalo, New York & Philadelphia*, extended 9 miles. *Port Royal*, extended from Steel Creek, S. C., northward five miles to a point 82 miles from Port Royal. *Lake Shore & Michigan Southern—Lansing Division*, extended from Eaton Rapids northward 17 miles to Lansing, Mich. *Cairo & Fulton*, extended from the Missouri line southward 11 miles, and from White River northeastward 74 miles, in all 85 miles. *Paducah & Memphis*, extended southward three miles to a point eight miles from Troy, Tenn. *Green Bay & Lake Pepin*, extended from Grand Rapids, Wis., westward 19 miles to a point 116 miles from Green Bay. *International*, extended northward from Troupe to Overton, Texas, 11 miles. *Houston & Great Northern*, extended northward 8 miles to a junction with the International at Palestine, Texas. *Lake Shore & Tuscarawas Valley*, completed by the extension from New Philadelphia southward 12 miles to a junction with the Pittsburgh, Cincinnati & St. Louis Railway at Uhrichsville, O. *Atchison, Topeka & Santa Fe*, extended 60 miles westward from Fort Dodge, Kansas, to a point 412 miles beyond Atchison. *Boston & Maine—Portland Extension*, completed by the laying of track on the section between Wells Village and Saco, Maine, 14 miles. *Cairo & Vincennes*, completed by the laying of track on 29 miles of road in different sections. *Ashtabula, Youngstown & Pittsburgh*, completed from Ashtabula to Youngstown, 62 miles, being 27 miles more than has been reported heretofore. *Milwaukee & St. Paul—St. Paul Division*, extended from Winona down the Mississippi 21 miles to a point within 9 miles of La Crosse, Minn.

This is a total of 326 miles of new railroad.

House Warming Car-Builders' Headquarters.

A number of the officers and members of the Master Car-Builders' Association some time ago concluded that its usefulness could be very much extended if a place were provided in New York for holding meetings, social reunions, etc. With this object in view a consultation was held, which resulted in renting several very convenient and comfortable rooms at No. 111 Liberty street. Through the exertions of Messrs. Garey and Smith, the rooms were neatly carpeted and furnished with conveniences for writing, etc. It is intended to make them a sort of rendezvous for the members of the Association, to supply

every convenience for the transaction of business, and to make it the depository of the archives of the Association, and for all records, drawings, models, etc., which it may be thought desirable to preserve. It was designed, in fact, to make the place a sort of club-room for the members of the Association while they were in New York.

About thirty members of the Association assembled, with as many of their friends, for the purpose of celebrating the opening of the rooms. The chair was taken by Mr. Andrews, and the objects of establishing the rooms was stated by Mr. Garey and others. A number of members and their friends presented their congratulations, and a substantial lunch was then served. After a liberal consumption of solids and absorption of liquids, a committee which was appointed to prepare resolutions reported as follows:

Whereas, The Master Car-Builders Association have been in special convention assembled in the rooms provided in the city of New York for the permanent occupation and casual meeting of its members, and

Whereas, The fittings and appointments of the same and the purposes for which they are provided meet our unqualified approval, therefore:

Resolved, That the thanks of this Association be, and the same are hereby, tendered to Messrs. Garey and Smith for their ability, taste and discretion in the selection and appointments of these headquarters.

The resolution was unanimously adopted. A committee, consisting of Messrs. Garey, Smith and Forney, as appointed for the purpose of receiving applications from inventors, manufacturers and other parties for the privilege of presenting models or drawings of their inventions to the notice of the members in the rooms of the Association.

A resolution was also adopted appointing the third Thursday evening of each month as the time for holding a business and social meeting in the rooms.

All members of the Association are invited to make use of the rooms while in New York, and especially to meet there at the time appointed for a regular monthly reunion.

CHICAGO AND TEXAS will be united by the completion of the Missouri, Kansas & Texas Railway; but the connection of Texas will not be to Chicago alone, as a Chicago paper seems to think but to St. Louis as well. The paper in question says: "By this route Chicago will be as near as, if not nearer to the great Southwest than St. Louis, whose southwestern connection, the Atlantic & Pacific, is far from reaching its objective point." The fact is that the Atlantic & Pacific has no line to Texas, and that the Missouri, Kansas & Texas is just as available to St. Louis as to Chicago, and, while the former city is 621 miles from the Texas terminus of that road, by the routes which run trains in connection, Chicago is 290 miles further from it—the shortest route from Chicago to Denison being, indeed, through St. Louis; St. Louis will, in no very long time, have a second and much shorter route to Texas by way of the Iron Mountain and Cairo & Fulton roads, which will give a route only about 480 miles long from St. Louis to Northeastern Texas. This will also be a direct route from Chicago, but St. Louis will have the advantage, for the simple reason that it is nearer to Texas by more than 250 miles. That Chicago will not be able to compete with St. Louis for Texas traffic we will not say, only it is well to understand that in this competition it must inevitably suffer from this disadvantage in distance. The fact that Chicago is a great cattle market, and that as yet St. Louis is not, gives the former city now one great advantage; but St. Louis will soon have completed excellent facilities for handling cattle, and it will be very discreditable to it if it does not secure the larger part of the traffic in cattle which come directly from Texas. Indeed, if there is any one field which that city can count as its own, it is this very territory west and southwest of it. It should have the same advantage in South Missouri and Kansas, Arkansas and Texas, that Chicago has in Northern Illinois, Iowa, North Missouri and Minnesota.

THE PERUVIAN RAILROADS, it is reported, are not likely to make such progress under the present administration as was intended by the late President Balta. The latter, it is suspected, was largely interested in the contracts made with Mr. Henry Meiggs, involving scores of millions of dollars. The new President, Prado, is said to be studying economy, and at first to have revoked the contract for the great Arequipa & Puno Railroad, which involves \$35,000,000. Afterwards it was decided to complete this work, but it is thought improbable that any contracts will be let for new works under the present administration. The railroads, many of them, are extremely difficult and costly to construct, and for a large part, if not the most part, run through an unproductive country; but the valuable guano deposits owned by the State have given it a foundation for credit which has enabled it to borrow immense sums for the construction of public works. Whether these are likely to be productive or not, it is not easy at this distance to judge; but there is danger of overdoing such work, even in a productive and rapidly growing country, and Peru does not grow in population very fast, however productive parts of it may be.

THE PROBLEM OF THE TANGENTS, propounded recently by "R. O. B.," has brought us a large number of solutions which we are unable to give this week, but will endeavor to present together, so that they may be compared readily, next week.

THE NEW YORK RAPID TRANSIT RAILROAD has been reported as abandoned, and it is true that the work which was begun at Fifty-second street has been suspended. But the officers of the company deny that there is any intention of abandoning the project, but that the present delay is for the purpose of receiving proposals for doing the work. The maps which purported to give the positions of the sewers, etc., have been found incorrect, after complete surveys by the company's engineers, and some unexpected difficulties in the management of the drainage have been met. It is also reported that some

modifications of the original plan may be asked of the next Legislature, one of which is the right of extension to the Battery.

IN CONGRESS, on the 17th, a bill was offered by General Banks appropriating \$100,000 for the official representation of the United States at the Vienna Exhibition. Some opposition was developed and the bill was referred to Committee on Appropriations. General Garfield, the Chairman of this Committee, is a man of broad views and enlightened public spirit, and it is believed that the bill will be reported favorably and will eventually pass. On the success of this bill, doubtless, depends very largely the representation of American industry at Vienna next year. Our manufacturers, many of them, will take the pains to provide objects for exhibition if they can be assured that they will be transported, received and duly cared for when they arrive.

American Society of Civil Engineers:

A regular meeting of this Society was held at its rooms in New York, Wednesday afternoon, December 4.

A paper was read upon "Rail Economy," by C. P. Sandberg, C. E., of London, in which, under the three heads "Iron Rails—Steel Rails—and Traffic Capacity," the author deals with the saving that may be effected in the item of railway cost.

Iron Rails.—The American demand for English rails, of say 600,000 tons yearly, is unlikely to diminish soon. The late increased expense of iron adds to the cost of railroad construction, and tends to reduce the quality of rails. Welsh rails were often imperfect in weld—now they are sometimes also brittle. In the Cleveland district rail making has greatly improved, chiefly by the increased application of settling in the puddling furnaces. Still the buyers must guard against lamination and brittleness by tests for strength and wear, applied before the rails are laid. Rails made of suitable iron, with a proper section, will not break in winter; in Scandinavia, with a climate more severe than in America, no accident has occurred from broken rails, though cross sleepers are exclusively used. But a very small portion of the iron rails shipped to America will stand the proper tests.

No late improvement promises so much to perfect iron rail-making as mechanical puddling, which now seems to be an entire success. Among the best appliances for this purpose are those of Danks and Spencer: one producing the whole charge in one ball, and the other in several small ones. By this improvement more rails can be made, at a reduced cost and of better quality.

Steel Rails.—The demand during the past year has been so great for steel rails, that they can hardly be obtained at any price; the supply is limited by the lack of ore free from sulphur and phosphorus, and recourse has been had to extensive mines in Spain. It is hoped that America will supply herself with steel rails, and import only those of iron required for new lines or light traffic. There is a scarcity of suitable ore for the Bessemer process throughout Europe, except in Sweden, which the recently discovered coal there will render more available.

The Siemens—Martin process of steel making—superior to the Bessemer in requiring a less pure ore—has thus far produced so little that it can hardly be called a source of supply in the great market.

Steel rails are now so well made that they rarely break, except when the flange is punched, and this should be done only while the metal is hot, or the notch drilled and then slotted. Although a steel rail is generally thrice as strong as an iron one, when punched or the flange is cracked, the iron may be the stronger. The steel is made as soft as possible, say with $\frac{1}{2}$ per cent. of carbon; for not by hardness, but by homogeneity, is it superior to iron.

Usually a steel rail will carry one-fifth more dead load than an iron one; hence, for the same traffic, the steel rail, in comparison with the iron, should not be reduced in weight more than 20 per cent.

Buyers should require each rail to be permanently marked, to indicate date, maker's name, and quality, that subsequent use may determine which manufacture is best.

Traffic Capacity.—The amount of wear or life of a rail is usually expressed in tons passed over it before rejection. Properly the speed of travel should be taken into account, and 220,000,000 speed tons is a fair expression of the endurance of extra iron rails.

The average life of iron rails in England for ordinary traffic is about 10 years; in and near London it is two years or less; on the Continent, from 12 to 15 years; and in Sweden—with less traffic than in England—from 15 to 18 years.

The weight passed over good iron rails before rejection has been found to average 10,000,000 tons. This may be taken to represent the life of extra iron rails, and six times that the life of good 56-pound steel rails. On the "London & Northwestern line" steel rails have lasted 20 times as long as iron, and on the "Metropolitan Railway," with the greatest traffic in the world, where iron would not have lasted six months, steel will stand from three to four years.

In comparing the relative economy of superior iron rails and those of steel, prices of each being taken at £7 and £11, and interest on capital 5 per cent., the yearly saving per mile would be £1 where iron rails would last 15 years, and were used; £10 where they would last 10 years, and steel were used, and £73 where the iron rails would last but five years and steel were used.

A table was given showing the gross load in tons which each quality and weight of rail may be expected to carry during its life, and the conditions were stated therewith to aid in the selection of rails to accommodate a given traffic—an important matter, since many European railways are laid with too heavy rails, and American with too light ones.

Equally important with the weight of a rail is a proper section. In England the "double-headed" rails are still

generally used, and elsewhere in Europe the flat bottomed pattern, as also in America. A specially bad section is the Erie 61-pound rail, which could be replaced by a 45-pound rail well proportioned.

Professor Rankine says the weight of the rails per yard in length should equal 15 times the greatest load on the locomotive drivers in tons. Perdonet, in France, takes 12 in place of 15; the writer, by adopting a section which permits a fish-joint stronger than the others in general use to be made, takes 10 and less. Thus for a 60-pound rail, the weight on drivers is put at 6 $\frac{1}{2}$ tons.

Fish plates of steel will enable rails to carry from 15 to 20 per cent. greater load than if iron were used of the same section; they will cost per ton about £1 less than steel rails, and the iron about £1 more than iron rails; hence the adoption of steel fish plates will be of benefit even with iron rails.

DISCUSSION.

Mr. Macdonald remarked that Mr. Sandberg, in taking 6 $\frac{1}{2}$ tons weight per locomotive driver as a safe load on a 60-pound rail, differs from the best practice in this country. The Philadelphia & Reading Railroad, on rails made with great care by the company, prefers not to exceed 4 tons on a 64-pound rail; and the rail section has been gradually increased to counteract wear and tear from even this medium load.

On the Erie Railway 5 $\frac{1}{2}$ tons weight on drivers has been found too great for the best 70-pound iron rails; and with a speed, for heavy freight trains, of 15 miles per hour, should not exceed 4 $\frac{1}{2}$ tons.

Mr. Allen remarked that this was of great personal interest to him. His first railway report dealt with the question of weight upon drivers, and showed the need of keeping it below certain limits. If greater weight is to be carried, the number of drivers should be increased; and the time will doubtless come when locomotives with 8, 10 and even 12 drivers will be used. In no way has more money been wasted in the construction and operation of railroads than by increasing the weight upon drivers, to the great injury of road-bed, rails and rolling stock.

Train Accidents in November.

Early on the morning of the 1st, an engine on the transfer track of the Western Union Railroad, at Savanna, Ill., exploded, quite demolishing the locomotive, throwing fragments half way across the Mississippi, but only slightly injuring the engineman and fireman, who were in the cab at the time.

On the morning of the 1st, a freight car on the Atlantic, Mississippi & Ohio Railroad "leaked over" in the street, in Norfolk, Va., while going around a curve, blockading the road several hours.

On the 1st, about 1 o'clock in the afternoon, a passenger train on the New York Division of the Pennsylvania Railroad ran into some cars that had been left on the track near Elizabeth, N. J., crushing some cars and disabling the engine, but hurting no one.

On the night of the 1st, between Hopewell and Bloody Run, Pa., on the Huntington & Broad Top Railroad, there was a collision between two freight trains running at full speed in opposite directions, wrecking both engines and a number of cars, and fatally injuring the conductor, engineman, fireman and a brakeman of one train, and the conductor of the other, and badly injuring a brakeman.

On the night of the 1st, near Frankville, Md., on the "Seventeen-Mile Grade" of the Baltimore & Ohio Railroad, two coke cars broke loose from a train and ran down the grade with fearful speed, killed a woman who was walking on the track, and finally struck the engine of an ascending freight train, knocking the cars to pieces and seriously damaging the locomotive.

Early in the month, on the Pennsylvania Railroad, an engine was standing alone at Gallitzin Station, with no one in the cab, the fireman being absent and the engineman being engaged in oiling. A train coming westward through a tunnel struck this standing engine very lightly, but with the effect of throwing its throttle-valve wide open. It immediately started westward down a grade of 80 feet to the mile, and soon acquired tremendous speed. At Lilly's Station, six miles from the point of starting, it struck the head of a freight train which was then moving about six miles an hour. The two locomotives were broken to pieces and a number of cars were broken up. No one was hurt, though the engineman of the freight train remained on his engine.

Near the first of the month, on the Winona & St. Peter Railroad, near Marshall, Minn., thirteen box cars of a freight train were thrown from a bridge 30 feet high, and two or three bents of the bridge were broken, by reason, it is said, of the spreading of the rails.

Early on the morning of the 3d, the sleeping car of a passenger train on the Memphis & Charleston Railroad caught fire and burned so rapidly that it was with great difficulty that the passengers escaped.

On the morning of the 3d, 18 out of 22 cars of a freight train on the Chicago, Rock Island & Pacific Railroad were thrown from the track by a broken rail, near Green River, Ill. The damage to cars was great.

On the 4th, a car of a freight train on the Flint & Pere Marquette Railway jumped the track at East Saginaw, severely injuring a brakeman who was on top of it.

On the afternoon of the 5th, a passenger train on the Portland & Rochester Railroad, by reason of a misplaced switch, ran into a siding at Bar Mills, Buxton, Maine, and struck a freight car which was being loaded there. The freight car and the locomotive were damaged somewhat, and two passengers were slightly hurt.

On the morning of the 5th, a switching engine, drawing several cars on the Atlantic & Great Western Railroad in Dayton, Ohio, ran into the rear of a freight train which was being backed toward it, damaging the switching engine considerably.

On the morning of the 6th, as an express freight train on the Rutland Railroad was moving on a side track at Sutherland Falls, Vt., four cars were thrown from the track, and two of them badly injured.

On the 6th, in Cleveland, Ohio, an engine of the Atlantic & Great Western Railroad ran into the rear of a freight train, breaking up one or two cars, damaging the engine, and injuring the fireman.

On the 6th, the baggage and express cars and one coach of a passenger train on the Utica & Black River Railroad, ran off the track near Lowville, N. Y., damaging one car, and slightly injuring the baggage-master.

On the night of the 6th, on the St. Louis, Kansas City & Northern Railway, at Belknap, Iowa, the locomotive of a freight train left its cars at the depot, and ran down a grade about half a mile to a water tank. While taking in water, the cars, which were not sufficiently held by the brakes, started down the track, and struck the engine so forcibly as to throw it and three cars from the track.

On the evening of the 7th, in the outskirts of the city of Scranton, Pa., on the Delaware, Lackawanna & Western Railroad, as a construction train with a party of laborers was backing into town, it encountered a mass of rock on the track, by the side of a precipice about 100 feet high. The caboose car, containing 15 or 20 men, went down this precipice, turning over and over, and at last striking wrong side up. A flat car behind was torn from its trucks and thrown across the track. Seven men were killed, nine wounded seriously and seven less severely.

On the evening of the 7th, a little distance from Scranton, Pa., on the Lehigh & Susquehanna Railroad, the passenger car of a mixed train was thrown from the track by a broken rail. It was dragged on the ties for about 150 feet, and then fell with the rear end down the embankment, and in this position was dragged, hanging to the train, about 150 feet further, when it struck the abutment of a culvert over a brook and was shattered by the shock, fatally injuring three passengers and injuring 16 others.

On the evening of the 7th, on the Indianapolis & Vincennes Railroad, near Sanborn, Ind., a passenger train encountered a plank which had been placed across the rails for the purpose. The engine went over, and also the baggage car, killing instantly the engineman and fireman.

After 10 o'clock on the night of the 7th, an east-bound passenger train on the Baltimore & Ohio Railroad ran into a Pullman car which had been detached from a Washington train, and was waiting on the side track at Relay House to be taken on by a west-bound train. There were six passengers in this car, four of whom were injured.

On the morning of the 8th, as an engine was moving down the track of the Georgia Railroad, in the city of Augusta, Ga., the throttle-valve broke as the engineman attempted to slacken speed, and the engine moved rapidly towards the yard, entirely beyond control, the engineman and fireman having jumped off to save themselves. The engine soon encountered some cars which a switching engine of the South Carolina Railroad was pushing toward it. The freight cars were badly crushed, the runaway engine and its tender thrown from the track, and the other engine and tender broken loose from the cars. The engineman of the latter had reversed before he jumped, and after the shock the engine began to move back from the scene of the collision towards the Savannah River. It struck a handcar on its way, the occupants of which abandoned it in time to save themselves, and, pushing it before it, ran through the yard, over the bridge, and about three miles beyond, when it stopped for want of steam. No one was hurt.

On the morning of the 8th, as a north-bound passenger train on the Western Union Railroad was about four miles above Savannah, Ill., a tender axle broke, throwing the tender from the track, knocking the trucks from under the mail car, and raising the car body upon the locomotive.

On the afternoon of the 8th, a passenger train of the East Pennsylvania Railroad ran into the rear of a passenger train of the Philadelphia & Reading Railroad as they were coming up to a depot in Reading, Pa., owing, it is said, to neglect in placing switch signals. Very little damage was done.

On the evening of the 8th, near Neola, Iowa, on the Chicago, Rock Island & Pacific Railroad, an axle or journal in the rear truck of a car in a west-bound freight train broke and let the end of the car fall to the rails, whereupon the three cars next following went to pieces and fell in ruins upon and on both sides of the track.

On the morning of the 9th, in Upper Montclair, N. J., on the Montclair Railroad, there was a collision between a north-bound stone train and a south-bound gravel train, by which two engines and a number of cars were broken up. Five men were severely injured.

On the morning of the 9th, at East St. Louis, Ill., a locomotive going out on the track of the Ohio & Mississippi Railroad ran into a freight train which at the time was crossing its path on the Vandalia road. Three cars, one of them loaded with glass, were demolished.

On the night of the 9th, at Coeyman's, N. Y., on the Athens & Schenectady Branch of the New York Central and Hudson River Railroad, by reason of a misplaced switch, the locomotive and nine cars of a freight train were thrown from the track and piled together at the foot of an embankment 25 feet high, injuring the engineman and fireman fatally and a brakeman dangerously. The switch rail had been disconnected from the target lever, and the latter set to indicate that the track was open.

On the 10th, an entire train was thrown from the track of the Central Railroad of New Jersey at High Bridge, N. J., by a cow which it encountered on the track.

Early on the morning of the 11th, there was a collision between a coal and a freight train at Montzer's Switch, Pa., on the Little Schuylkill Railroad, causing considerable damage to both trains.

On the 11th, at a gravel pit near Indianapolis, on the Indianapolis, Bloomington & Western Railway, there was a collision between a passenger train and a gravel train, temporarily disabling the former.

On the evening of the 11th, a north-bound passenger train on the Indianapolis & Vincennes Railroad ran into a south-bound extra freight near Gosport, Ind., damaging both engines and the baggage car, but hurting no one.

On the night of the 11th, a north-bound mineral train on the St. Louis & Iron Mountain Railroad jumped the track at a station in Carondelet, killing a brakeman and dangerously wounding the engineman and conductor.

On the 12th, a passenger train, owing to a misplaced switch, ran into the rear of a freight train which was standing on a side track of the Portland & Rochester Railroad at Buxton, Maine. The passenger train was slacking up to stop, and the shock was not very severe, bruising slightly four passengers.

On the evening of the 12th, a locomotive struck the rear of a freight train at a crossing of tracks at the corner of Canal and Kinzie streets, Chicago, on the Chicago & Northwestern Railway. The tender of the locomotive was thrown from the track, and the rear car of the freight train slightly damaged.

On the evening of the 12th, near Fairfield, Iowa, on the Burlington & Missouri River Railroad, three cars of a west-bound freight train were thrown from the track.

About 10 o'clock on the night of the 12th, a south-bound express train on the New York Central & Hudson River Railroad ran off the track between Troy & Greenbush, just as it was to enter a covered bridge at Griswold's mill. The engineman and fireman were badly hurt, and the switchman was found about 200 feet from his switch, nearly insensible. The engineman was robbed after the accident, and while he was senseless, and it was at first suspected that the thieves had beaten the switchman and misplaced the switch with the intention of robbing the train; but it is said that the switchman, having switched some cars to the side track, was suddenly paralyzed as he was about to turn the switch to the main track.

On the morning of the 13th, a construction train on the Baltimore & Potomac Railroad ran into four cars loaded with gravel which had broken loose from a train while passing through a tunnel in the southeastern part of Washington. Four workmen were severely injured.

On the morning of the 13th, at Newark, N. J., an express train on the Morris & Essex Railroad, while passing a train on the parallel track of the Central of New Jersey going in the same direction, was struck by a timber which projected too far from a flat car of the Central train. The passenger cars were badly broken, but no one was hurt.

On the morning of the 13th, near Clark's Mills, N. J., on the Rome & Clinton Branch of the New York & Oswego Midland Railroad, a construction train ran off the track, tearing up the rails for some distance and piling together ten cars of the train. The spreading of the rails is assigned as the cause.

Early on the morning of the 14th, near the Milwaukee stock yards of the Milwaukee & St. Paul Railway, there was a collision between a freight train from the Northern Division and one from the La Crosse Division of that road, by which a fireman was killed and some cars wrecked.

On the 14th, a freight train of the Central Railroad of New Jersey ran off the track near Communipaw, N. J., blocking the track for some hours.

On the 14th, at Hamburg, Iowa, on the Kansas City, St. Joseph & Council Bluffs Railroad, a passenger train ran off the track, blocking the track for two hours, but hurting no one.

On the morning of the 15th, near Devall's Bluff, on the Memphis & Little Rock Railroad, the locomotive and five cars of an east-bound freight train were thrown from the track. The engineman was killed, and the fireman severely injured. Both of these jumped, but were caught under the engine. A broken rail is said to have caused the accident.

On the 15th, an east-bound express train on the Baltimore & Ohio Railroad, near Clarksburg, W. Va., ran into two cows, causing the train to leave the track and crash through a small frame dwelling occupied by a man, wife and infant, injuring the child severely but not dangerously. The train was delayed nine hours.

On the morning of the 15th, the engine and baggage-car of a west-bound passenger train on the St. Paul & Pacific Railroad ran off the track, by reason of a misplaced switch, just beyond the depot in Minneapolis. The engine went into the ditch, injuring both engineman and fireman, and the car was badly wrecked.

On the afternoon of the 15th, on the same road, and at the same place, the engine and baggage-car of an east-bound passenger train left the track at the switch frog, and went into the ditch, injuring no one.

On the afternoon of the 15th, at Corymbo, Ind., on the Michigan Central Railroad, the engine, baggage cars and two coaches of an express train left the track at a frog, delaying the train several hours.

On the same day and road, at Leoni, Mich., a sleeping car of an express train jumped the track for some unexplained reason, with very little damage.

At 9 p. m., on the same day and road, there was a collision between an east-bound freight train and a locomotive near Kalamazoo, Mich., blocking the road for some hours.

On the afternoon of the 15th, as a switching engine of the Indianapolis, Cincinnati & Lafayette Railroad, with two cars attached, was standing on a side track north of Indianapolis, another train was backed into the same track and struck the standing train with such force as to jolt open the throttle valve and at the same time shake off the engineman, who was standing on the foot-board. The engine with its two cars at once started at considerable speed and ran some distance through streets nearly to the Union Depot; but the steam ran down so that some one was able to board it and stop it before any damage was done.

On the afternoon of the 15th, a freight engine started on the

Danville trestle work of the Indianapolis & St. Louis Railroad and was run into by a special freight train, ruining one engine and tumbling 13 cars into the creek below. A man who was stealing a ride in one of the freight cars was somewhat hurt.

On the evening of the 15th, at Cheektowaga Crossing, on the Erie Railway, three miles from Buffalo, a locomotive of one train ran through passenger cars of another, wrecking locomotive and cars and slightly injuring one passenger of 15 or 20 who were in one of the cars.

On the night of the 15th, four miles east of Sparta, Wis., on the La Crosse Division of the Milwaukee & St. Paul Railway, a sleeping car and two passenger cars of a west-bound passenger train were thrown from track and down an embankment ten feet high, the sleeping car turning completely over. No one was much hurt. A broken rail is reported as the cause.

On the 16th, the boiler of a locomotive exploded on the Mississippi Central Railroad at Grenada, Miss., fatally injuring the fireman.

Near midnight on the 16th, on the Atlantic & Great Western Railroad, near Bowinsville, Ohio (not far from Springfield), as a freight train was running at a good rate of speed, the boiler of the locomotive suddenly exploded, shattering the locomotive, throwing the tender across the track, and piling together a number of cars. The engineman and a brakeman were instantly killed, and the fireman was dangerously injured. The latter reports that the engineman had been overworked, and lacked sleep, and had remonstrated against making this trip; also that the boiler leaked badly. The fireman had often during the trip called the engineman's attention to low water, but he seemed too sleepy to notice it himself.

At 10 o'clock on the morning of the 17th, as a number of empty coal cars were backing across the Lehigh & Susquehanna Bridge at Bethlehem, Pa., a freight train on the Lehigh Valley Railroad, which crosses at this point, struck the moving cars at the crossing and drove two of them forcibly against a restaurant adjoining. A brakeman was thrown from the train and fatally injured.

On the morning of the 17th, at Ansonia, Ind., on the Cleveland, Columbus, Cincinnati & Indianapolis Railroad, an extra train ran into the rear of a freight train which had stopped to let another train pass. The caboose was lifted upon the engine, which was so broken as to discharge steam freely, and this terribly scalded the four occupants of the caboose, all of whom were passengers. Two of them soon died.

On the 17th, near Clairmont Station, on the Winona & St. Peter Railroad, an engine pushing a snow-plow ran into the rear of a freight train which had stuck in the snow, shattering the caboose, wrecking the snow-plow and throwing into the ditch the engine behind the latter. A red light had been sent back from the freight train, but there was a blinding snow-storm at the time, and the immense snow-plow made it difficult to see at all from the engine.

A little after midnight on the 18th, on the Pacific Railroad of Missouri, near the depot in St. Louis, a switch engine, while making a running switch, left the track and fell on its side across the track, injuring the engineman, fireman and a brakeman, one of them dangerously.

Very early on the morning of the 18th, a passenger car of a train on the Indianapolis, Cincinnati & Lafayette Railroad was thrown from the track by the backing of the forward truck at Smith's Crossing, Ind., delaying the train some hours.

On the evening of the 18th, there was a collision between two freight trains on the Louisville, Cincinnati & Lexington Railroad near Verona, Ky., doing very little damage.

On the morning of the 19th, a north-bound freight train on the Wisconsin Division of the Chicago & Northwestern Railway ran off the track a few miles south of Oakshosh, Wis., breaking to pieces eight cars. The cause is said to have been the spreading of the rails, made possible by the drawing of the spikes through frost.

On the morning of the 19th, a south-bound freight train on the Louisville Branch of the Ohio & Mississippi Railroad ran into the rear of a passenger train which had been standing at Deputy Station, Ind., but began to pull out on discovering the approaching freight train. The rear car was wrecked and partly telescoped with the one before it, and three women and an infant who had been unable to escape from the rear car were more or less injured. The freight train was several hours behind time, was coming down a steep grade at high speed, and was very near the rear of the passenger train before brakes were called. The engineman of the passenger train started his train just before the collision. Most of the passengers in the rear car jumped off before the collision.

On the 19th, about noon, there was a collision between a mixed train of the Schoharie Valley Railroad and a passenger train of the Albany & Susquehanna, at the junction of the two roads at Central Bridge, N. Y. The former train had just entered upon the Albany track to run from the junction to the station, having made the required signals. Both engines were damaged and nine freight cars thrown from the track.

On the 19th, there was a butting collision between a passenger and a freight train on the Michigan Central Railroad, near Kalamazoo, Mich., wrecking both engines and a number of cars.

On the 19th, at Trenton, Mo., on the Chicago & Southwestern Railway, an engineman, after taking on coal and water at a little distance from his train, backed into it with such force as to wreck the baggage car and damage the tender.

On the 19th, a freight train on the Millstone Branch of the New York Division of the Pennsylvania Railroad ran off the track at Millstone, N. J., damaging three cars and delaying trains considerably.

On the night of the 20th, as a freight train was crossing the main track of the Erie Railway at Suffern, N. J., an express train dashed into it, wrecking badly several cars of the freight and also the express engine. The express was behind time.

On the night of the 20th, in pulling into a switch on the Erie

Railway at Hancock, N. Y., four cars of a train were thrown from the track, delaying trains some time.

One night about the middle of the month, at Wanaque, N. J., on the Montclair Railroad, 15 miles north of Paterson, a passenger train ran into a box-car which is supposed to have been maliciously pushed from a side track to the main track. The engineman saw it when it was too late to stop, and put on steam and struck it with full force. It was demolished, the engine wrecked and one car thrown from its truck, but no one was much hurt.

On the morning of the 21st, a north-bound mail train on the Cleveland, Columbus, Cincinnati & Indianapolis Railroad was thrown from the track at Kneisley's Station, Ohio, by the breaking of a rail which had been badly worn. One person was badly hurt.

On the afternoon of the 21st, the engine and tender of an east-bound train on the Pacific Railroad of Missouri were thrown from the track at Franklin, Mo., by cordwood on the rails, delaying the train three or four hours.

On the evening of the 21st, on the Southern Central Railroad at its junction with the Lake Ontario Shore Railroad, a car full of passengers having become detached from the rear of a mixed train, the train was backed upon it with such force as to cause the death of a brakeman and bruise several passengers.

On the night of the 21st, a freight train on the Jacksonville, Pensacola & Mobile Railroad ran into a log car which was standing on the track, about five miles west of Sanderson, Fla., wrecking the engine badly. The car had been lying in the ditch for some time, but had that day been placed on the track by the company's employees, who, with inconceivable stupidity, went away and left it there.

A few minutes before 2 o'clock on the morning of the 22d, the Washington express on the Philadelphia, Wilmington & Baltimore Railroad ran into the rear of a long passenger train which had come to a halt on the track for want of steam, two miles north of Wilmington, Del. The engine penetrated six or eight feet into the rear car (which contained about 30 passengers), and telescoped it with the car in front of it, injuring fatally three persons, and 15 others more or less seriously. The locomotive with which the train started was disabled near Chester, Pa., and the one which replaced it seemed to have insufficient power for the train, which consisted of ten cars, while the disabled locomotive had to be hauled a few miles. The train lost time continually, and the New York express was very nearly due when it came to a stand; but not till then, it is reported, was a flagman sent back to warn the expected train. He had gone about 800 feet when the express came in sight of him. About this time a north-bound train passed on the other track, and, discovering the danger and the flagman, signaled the south-bound express; and it is said that the latter observed this signal before the flagman was visible to it. The passengers in the rear car had crowded into the front of it before the collision. No account is given of the brake-power used; but power brakes should have been able to have so reduced the speed of the New York express in a distance of 800 feet that the collision would have been slight, and proper platforms should have prevented the telescoping of the two passenger cars. The road has used both, and is esteemed as carefully and conscientiously managed. The verdict of the coroner's jury over one of the killed was "that Henry C. Fritz came to his death by a collision that occurred about 200 yards south of Ellerslie Station, between the train that left Philadelphia at 11:30 on the night of the 21st inst. and the train which left West Philadelphia at about 12:40 on the morning of the 22d inst., which collision was caused by or through the incompetency and neglect of Mr. Anthony Rue, conductor of the train leaving Philadelphia at 11:30 p. m., on the night of the 21st of November, 1872."

On the night of the 22d, a passenger train on the Newark & Elizabeth Branch of the Central Railroad of New Jersey jumped the track at Amboy Junction, near Elizabethport, N. J. The locomotive was turned directly across the track. The cars kept their places on the rails, and the passengers were uninjured. The engineman sustained serious bruises and cuts. A misplaced switch is said to have been the cause.

On the night of the 22d, several cars of a freight train loaded with heavy blocks of granite were thrown from the track of the Boston & Albany Railroad between Chatham and East Chatham, Mass., by the breaking of a journal. Several cars were wrecked, and a brakeman had his leg broken.

On the 22d, an east-bound freight train on the Vicksburg & Meridian Railroad ran over three mules on a trestle near Brandon, Miss., throwing engine, tender and four box cars off the track and wrecking them. The engineman was somewhat hurt and the road blocked twelve hours.

On the morning of the 23d, on the Knoxville Branch of the Louisville & Nashville Railroad, a freight train of 19 cars ran over a misplaced switch, and five cars were thrown from the track and broken up.

On the 23d, there was a collision at Fairview, O., on the Pittsburgh, Fort Wayne & Chicago Railway, between a west-bound express train and an east-bound freight train, injuring one man severely and damaging somewhat both engines.

On the evening of the 23d, an east-bound freight train on the Bloomington Branch of the Toledo, Wabash & Western Railway ran into a heavy freight engine of the Chicago, Danville & Vincennes Railroad, which was standing at the time directly on the crossing at Hoopston, Ill. This engine was thrown down an embankment seven feet high, and the engine of the moving train fell upon it. No one was hurt, but the tracks were blocked nearly 24 hours, and the damage to the engines was great.

On the 23d, a freight train on the European & North American Railway, near St. John, N. B., ran into the head of a gravel train, which at the time was backing down the track. Both locomotives were thrown from the track, and the engineman and fireman of the freight engine were killed, and one other train

man slightly injured. The freight train is said to have been ahead of time.

Early on the morning of the 24th, on the Boston & Albany Railroad, at Mittineague, Mass., a west-bound freight train was wrecked, 11 cars being demolished and 73 cattle killed. The engine and the first two cars of the train, which were to be left at Mittineague, were cut off from the rest a mile west of the station, but while they were being switched off the balance of the train came on at great speed and dashed into the engine and car next it, car after car being heaped one upon another till eleven had been demolished. The engineman had several ribs broken.

On the 24th, as a special train conveying officers of the company was running at a high speed up the Chicago, Dubuque & Minnesota Railroad, it ran into a wood train which was receiving a load at a curve between Clayton and McGregor, Iowa. The wood train was badly wrecked, but the special was able to proceed.

On or about the 25th, the engine and 21 cars of a coal train on the Syracuse & Binghamton Division of the Delaware, Lackawanna & Western Railroad ran off the track near Syracuse, N. Y.

On the morning of the 25th, an engine on the Wilmington & Reading Railroad ran off the track in passing from a side track to the main track at Center Station, Del., slightly damaging it.

On the evening of the 25th, an express train on the New York, New Haven & Hartford Railroad struck an oak post, which evidently had been laid across the track with malicious intent, a few miles below Thompsonville, Conn. The shock threw the post upon the pilot, where it remained until the platform at Thompsonville knocked it off, when the engine ran over it and, with two or three cars, was thrown from the track by it, but without damage, as the train was barely moving at the time. The perpetrator was arrested, tried, convicted and sentenced to ten years' imprisonment.

On the night of the 25th, on the Wilmington, Columbia & Augusta Railroad near Florence, S. C., a freight train was thrown from the track by a broken rail, and seven or eight cars were broken up.

Early on the morning of the 26th, about 30 miles east of Elko, Nevada, on the Central Pacific Railroad, an east-bound freight train was badly wrecked in some way unreported. The road was blocked about seven hours.

On the morning of the 26th, a passenger train on the New York Division of the Pennsylvania Railroad, at Trenton, N. J., scraped along the rear car of a train which had been run into a siding, but did not quite clear the main track. The sides of the passenger cars were badly scratched, some of the windows broken in, and some passengers were slightly bruised or cut.

On the 26th, a freight train on the Pacific Railroad of Missouri ran off the track at Jefferson City, blocking the road for four hours.

On the night of the 26th, an express train from Cincinnati, on the Pittsburgh, Cincinnati & St. Louis Railway, ran into the rear of a freight train near Coshocton, Ohio, killing the engineman, seriously injuring an express messenger and breaking up the locomotive and express car of the express train. The freight train had been run into a siding, but the end of the rear car extended over the main track.

On the night of the 26th, a passenger train on the Charlotte, Columbia & Augusta Railroad was thrown from the track, and two sleeping-cars so injured that they could not be taken on. A sleeping-car porter was severely injured. A defective rail is said to have been the cause.

On the morning of the 27th, four cars of a train jumped the track in Kankakee, Ill., on the Cincinnati, Lafayette & Chicago Railroad.

On the morning of the 27th, in Kankakee, Ill., on the Illinois Central Railroad, an engine ran into a freight train, throwing the locomotive and one car from the rails and blocking the track some hours.

About 1 o'clock on the afternoon of the 28th, a south-bound passenger train on the Syracuse & Binghamton Division of the Delaware, Lackawanna & Western Railroad ran off the track while running at high speed near Jamesville, about seven miles south of Syracuse. It ran a few rods on the ties, and then plunged down an embankment 15 feet high. The engine was half buried in the mud, the baggage car was thrown 30 feet from the track; the first car was thrown on its side upon the locomotive; the second car was turned bottom upward and badly broken. The latter caught fire, which was soon put out. The engineman was killed, the fireman dangerously injured, and at least five passengers considerably injured. The cause of the engine leaving the track is said to have been a badly worn rail on the curve. An indignation meeting was held in Syracuse, at which the management of the road was denounced, and the removal of the Superintendent of the Division, Mr. P. Elmandorf Sloan, demanded. He has since resigned. It appears, however, that the accident was due to lack of proper maintenance of track, and not to faults in working the trains. The verdict of the coroner's jury found that the track of this road is in many places very much worn and dilapidated, and is wholly unfit for passenger traffic in the locality of the accident; that many of the rails are insecurely laid; that a considerable portion of the track is laid with pieces of rail ranging from six to twelve feet in length, and concluded by condemning the management of the operative branch of the road in very strong terms.

On the night of the 28th, a passenger train on the Morris & Essex Division of the Delaware, Lackawanna & Western Railroad was thrown from the track by a misplaced switch, it is believed. The cars were half thrown over, and two passengers were considerably injured.

On the morning of the 29th, an express train ran into a wood train which was just pulling out from the station at Henderson, Minn., on the St. Paul & Sioux City Railroad. The express was an hour behind time, and the station had no telegraph office,

and seems not to have been a regular stopping place for the express. The wood train sent out a man to flag the express, but not until it had started, or very soon after, for he had only fairly started when the express came around the curve. Its engineman called brakes and reversed his engine, and the engineman of the wood train pulled the throttle-valve wide open. The latter action, however, caused a coupling to break, so the cars of the wood train were left standing. The caboose and the engine were wrecked, but no one was hurt.

On the 29th, at noon, a passenger train on the Vermont Central Railroad ran into the rear end of a freight train at South Royalton, Vt., breaking up several freight cars and damaging the locomotive and baggage car of the passenger train.

On the evening of the 29th, an accommodation train on the Boston & Providence Railroad ran into the rear of a freight train near the Coliseum, in Boston. The engine and four cars were wrecked, and some horses were killed.

On the night of the 29th, the Cincinnati express, going east on the New York Central & Hudson River Railroad, left Syracuse twenty minutes late. An east-bound stock train, taking the express' time at Manlius, the next station east of Syracuse was trying to make Chittenango, 6½ miles east, but failed and had become nearly stalled before reaching the latter station, where it was overtaken by the express. The express engine dashed into the rear of the train and passed through nearly five cars before it left the track. The engineman and fireman kept to the engine, and suffered severe though not fatal injuries. The night was intensely dark and the air filled with falling snow, which hid the lights of the stock train until the express engine was close to them. On recovering from the shock, it was ascertained that the express was running at the rate of forty miles per hour when it struck the stock train, and brought up in a length of seven cars, and yet not a platform was injured nor a coupling broken, and the passengers escaped unharmed. It is believed that had it not been for the Miller platforms the cars would have telescoped, with great loss of life.

Early on the morning of the 30th, a switching-engine on the Erie Railway ran into a caboose which was standing on a switch at Binghamton, N. Y., seriously injuring a man who was sleeping in the caboose.

On the evening of the 30th, a passenger train on the Ohio & Mississippi Railroad ran into the head of a freight train, just as it was entering a switch a mile east of Cincinnati. Both engines were badly wrecked, and the engineman and fireman of the passenger train were injured.

This is a total of 103 accidents, 19 of which caused death, and 26 less serious injury to persons. Therefore 53 of the accidents occasioned no injury to persons, or injury so slight that it has not been reported.

We tabulate these accidents as to their nature and causes as follows:

Derailements.	
Unexplained.....	18
By misplaced switch.....	6
By broken rail.....	6
By spreading of rails.....	3
By cattle.....	3
By malicious obstruction.....	2
By accidental obstruction.....	2
By broken axle.....	2
By defective rail.....	2
By broken car truck.....	1-43
Collisions.	
Rear collisions.....	27
Head collisions.....	14
Crossing collisions.....	6
Unknown.....	4-51
Boiler explosions.....	1
Burning of car in train.....	1
Striking projecting timber on parallel car.....	1
Broken axle.....	1
Unknown.....	1
Total.....	103

Probably the most remarkable feature in this painfully long list is the great number of collisions, which class forms nearly one-half of the whole number. They caused death to 16 and injury to 53 other persons, 37 being the total number killed and 114 the total number injured. Another prominent feature is the number of accidents causing or caused by runaways, indicating that it is not only when his train is in danger that a man should stick to his engine. There are no less than four of these reported. Besides the six derailements, two collisions were caused by misplaced switches. No less than three of the accidents are chargeable to careless backing, and two were caused by bad side-tracking, which left the tail of train in the way of cars on the main track. Four of the accidents were maliciously caused, and two of these caused the death of four men and the severe injury of a fifth. There were, meanwhile, several unsuccessful attempts to wreck trains.

For the ten months ending with November our record is as follows:

	No. of Accidents.	Killed.	Injured.
February.....	21	18	128
March.....	27	3	67
April.....	22	13	32
May.....	27	9	33
June.....	44	63	114
July.....	31	35	66
August.....	53	14	39
September.....	71	24	104
October.....	80	29	102
November.....	103	37	114
Totals.....	459	245	799

The number of accidents last month, therefore, is seen to be twice as great as the average in our reports, and the number of killed and injured one half above the average, the total casualties being greater than for any other month, except June, though nearly equaled in February. As we have said before, the increase in the number of accidents is probably not so great as appears from our record, as during the first few months of our reports we were unable to make them so complete as afterwards. But we have aimed always to report all accidents which come to our notice in any way, and doubtless our error is still in lack of completeness. But we think that not many of the cases which cause death or serious injury escape our notice and record.

General Railroad News.

CHICAGO RAILROAD NEWS.

Illinois Central.

The company reports as follows its receipts during November:

Land Department.	
Acres construction land sold.....	6,100.79 for \$38,844.33
Acres interest fund lands sold.....	998.80 for 5,154.00
Acres free lands sold.....	593.87 for 3,769.35

Total sales during the month of November, 1872, 7,693.46 for \$47,767.58
Cash collected in November, 1872..... \$62,587.93

Estimated Earnings—Transportation Department.

	In Illinois. 707 Miles.	In Iowa. 402 Miles.	Total. 1,109 Miles.
Freight.....	\$378,368.00	\$71,277.00	\$449,645.00
Passengers.....	108,410.55	37,576.40	145,986.95
Mails.....	6,375.00	3,059.38	9,434.38
Other sources.....	73,625.00	2,640.67	76,265.67
Total, November, 1872.....	\$566,778.55	\$114,553.40	\$681,331.95
Total actual earnings, Nov., '71.....	631,199.35	124,236.65	755,436.00
Decrease.....	\$64,420.80	\$9,683.25	\$74,104.05

This is a decrease of nearly 10½ per cent. in the Illinois earnings, nearly 8 per cent. in the Iowa earnings, and 9½ per cent. in the total earnings.

Chicago, Pekin & Southwestern.

This road, as has already been stated, has been completed for three or four weeks. It will be opened for traffic and business on the 1st of January. The stations on the line are as follows: Streator, Reading, Long Point, Dana, Minonk, Benson, Rock-oke, Eureka, Washington, Morton, Groveland, Pekin.

Chicago, Burlington & Quincy.

It is expected that the consolidation of this road with the Burlington & Missouri River road will be perfected next week, and that the two roads will fall under a single management after the first day of January. This company will remove its general offices from Nos. 504 and 506 Michigan avenue to the corner of Michigan avenue and Randolph street, about the first day of January. The company will occupy four stories of the building, and the offices will be reached by a convenient stairway, starting from Michigan avenue. The second story will be occupied by the President, General Superintendent, Division Superintendent, Telegraph Department, General Freight Agent and the Treasurer. The third story will be occupied by the Auditor, Purchasing Agent, General Ticket Agent, conductor's room and the offices of the Chicago & Iowa road. The Chief Engineer will be in the fourth story, and the fifth story will be occupied by the Freight Auditor.

Lake Shore & Michigan Southern.

The earnings of this road for the past year will exceed very largely those of the preceding year. The earnings from freight alone for the first eleven months of the year are over two millions in excess of the earnings for the corresponding eleven months of last year, and there is a large increase from the passenger earnings.

Chicago, Rock Island & Pacific.

This company reports a gradual increase of earnings. The Southwestern Branch is through a new country which is in process of settlement, and will develop its local business as the country along the line is developed.

On the 16th the President sent the following notification to the President of the New York Stock Exchange:

"In accordance with the rules of the New York Stock Exchange, you are hereby notified that after 30 days this company will issue 60,000 shares of additional capital stock. The proceeds of such additional shares are required for building double track and side tracks, substituting steel in place of iron rails, building new passenger and freight depots, machine shops and engine houses, adding new equipment, completing branch roads, substituting permanent structures of stone and iron in place of wooden structures, reduction of grades on the Iowa Division and for other purposes of the company."

This swells the amount of capital stock to \$25,000,000, and, the bonded debt being \$9,000,000, increases the capital account by about 21½ per cent. The notification has scarcely any influence on the price of the stock in the exchange, which is maintained at about 110. It is reported, however, that the stock had been very largely oversold for future delivery, and that a large part of this new issue will be absorbed in filling these orders.

Chicago & Northwestern.

The rivalry which is likely to exist between this road and the Milwaukee & St. Paul, as soon as the latter company opens its road to this city, promises to make some improvement in the alignment of the former. The short section of 16 miles, which will connect Janesville, Wisconsin, with Evansville, on the Madison Division northwest of Janesville, straightens the line between this city and St. Paul, and this section of road is to be built promptly on the opening of spring, when, with the completion of the Madison Extension, the company will have the most direct route to the capital of Minnesota. Iron manufacturers from Cleveland and St. Louis are in consultation with the officers of this road, in order to get branch lines constructed to their iron mines in the Northern Peninsula of Michigan, and as the company purpose to foster this business as much as possible, the time is not far distant when there will be developed perhaps the greatest business in iron ore transportation to be found in the world.

The Menominee Extension, which connects the Wisconsin and Peninsula Divisions, and completes the company's line from Chicago to Lake Superior, was completed December 2. The section from Fort Howard (at the head of Green Bay) to Menominee was constructed last year. That built this year is from Menominee to Escanaba, a distance of 70 miles. The direction from Menominee is northwesterly, but the railroad for some distance, we believe, extends nearly due north from Menominee, keeping some distance from the bay and in this way approaching more closely valuable iron mines, which are expected to afford the road a large traffic. The distance from Menominee to Escanaba, which is in the State of Michigan, is something more than 70 miles, and the entire rail distance from Chicago to Marquette is about 437 miles, all but the 13 miles next Marquette being the Northwestern road. The completion of this line will for the first time bring Marquette and the Lake Superior iron country fully "into the world" during the winter. Heretofore its only communication with the rest of the world during this season has been by sleighs from Escanaba along the bay to the terminus of the Wisconsin Division. This is one of the links long needed to complete the system of the Northwestern. By the completion of this road this year the company secures a considerable land grant, said to be very valuable.

On the same day the new branch from Geneva south to Batavia, Ill., three miles, was opened. This line runs closer to the stone quarries, which afford the largest exports of Batavia

than any other road, and gives the town its shortest line into Chicago. It is on the west bank of Fox River. Batavia is a very beautiful and quiet town, and offers attractions as a suburban residence.

Pittsburgh, Fort Wayne & Chicago.

Thomas A. Scott and several other officials of the Pennsylvania Company are to be in Chicago this week, to consult with the officers of the Milwaukee & St. Paul Company with regard to the construction of the great passenger depot which is to occupy the space between Madison and Van Buren streets, and between the river and Canal street, and it is understood that arrangements will then be perfected for the construction of a finer passenger depot than any now in existence in the city.

Chicago, Danville & Vincennes.

This company has now got its through trains fitted out with sleeping cars of the Woodruff pattern, which run through to Evansville without change. A large transfer barge is in process of construction, which will be employed in transferring cars from the Indiana to the Kentucky side of the river, thus avoiding the present inconvenience of breaking bulk. The company has its Fountain County Branch nearly completed, only about three miles remaining of track-laying. This will be finished and ready for use by the 1st of January. The company is about contracting for a thousand new freight cars, and the next season promises to be one of great success in a business point of view. A new grain elevator has just been completed on the south side of Kinzie street, between Elizabeth and Ada streets, where grain will be stored for city consumption and for transfer to other railroad lines. The Cairo & Vincennes line is now completed, opening a new line to this road in that direction. Although this road is expected to be under the management of the Pennsylvania Company, it is probable that arrangements will be perfected whereby much benefit will be derived for the Chicago, Danville & Vincennes Company.

Chicago & Pacific.

This company has pushed the work of track-laying to a point west of the Des Plaines River, and it is estimated that 30 days will see the road finished to Elgin. The company has received cars and engines sufficient for its first passenger train.

ELECTIONS AND APPOINTMENTS.

—Mr. C. E. Benton, late Master Mechanic of the Indianapolis & St. Louis Railroad at Mattoon, Ill., is now in the St. Thomas shops of the Canada Southern.

—At the annual meeting of the Richmond & Danville Railroad Company, held at Richmond, Va., December 12, A. S. Buford, A. Y. Stokes and H. H. Marshall, of Richmond, Va.; William L. Owen, of South Briton, Va.; W. T. Sutherland, of Danville, Va., and John R. Edmunds, of News Ferry, Va., were re-elected directors. Colonel A. S. Buford was re-elected President for the ensuing year.

—On the 11th, Mr. John W. Garrett was chosen President of the Baltimore & Ohio Railroad Company for the fifteenth term.

—At the annual meeting of the stockholders of the Orange, Alexandria & Manassas Railroad Company, at Alexandria, Va., November 27, Mr. John S. Barbour was re-elected President, and Messrs. R. A. Coghill, W. D. Hart, W. G. Cazenove, D. E. Slaughter, E. C. Marshall, S. A. Coffman, C. F. Suttle and C. M. Blackford directors for the ensuing year.

—At the annual meeting of the Chesapeake & Ohio Railroad Company, at Richmond, Va., December 10, the following board of directors was chosen: C. F. Huntington, A. A. Low, Wm. H. Aspinwall, of New York; Pliny Fisk, of New Jersey; David Stewart, James G. Clark, William B. Hatch, William White-wright, Jr., of New York; H. C. Parsons, West Virginia; John Echols and Williams C. Wickham, Virginia. The only change made in the board is the election of Mr. Whitwright in place of General J. R. Anderson, of Virginia, who declined a re-election.

—At an adjourned annual meeting of the stockholders of the International Bridge Company, held at Buffalo, N. Y., December 11, the following gentlemen were elected officers for the ensuing year: President, C. J. Bridges; Vice-President, E. G. Spaulding; Secretary and Treasurer, Joseph Hickson; Directors, Hon. James Ferrier, Eben. C. Sprague, John Bell, A. Walsh, P. R. Jarvis.

—At the annual meeting of the stockholders of the Utica, Chenango & Susquehanna Valley Railroad Company, held at Utica, N. Y., December 10, the following board of directors was chosen for the ensuing year: Samuel Sloan, John Brislin, William E. Dodge, Moses Taylor, Lewis Lawrence, Miles C. Comstock, Daniel Crouse, Hiram Hurlbut, Morgan Bryan, Naaman W. Moore, George W. Chadwick, Daniel B. Goodwin, Devillo White. Messrs. Crouse and Hurlbut are new directors, taking the places of John Thorn and Thomas Potter; the rest of the board is re-elected. At the meeting 24,665 shares of stock were represented and voted on.

—Lloyd Tilghman has been re-elected President, Mordecai Price Treasurer, and William H. Jacobs Secretary of the Queen Anne's & Kent Railroad Company for the ensuing year.

—A circular from Galusha A. Grow, President of the International and the Houston & Great Northern railroad companies, announced that, beginning with December 1, the two roads would be operated under one General Superintendent. H. M. Hoxie was accordingly appointed General Superintendent, and S. Scoch Superintendent of the Great Northern Division. It was also announced that Thomas J. Shellhorn would remain as Master Mechanic of that division.

TRAFFIC AND EARNINGS.

—The earnings of the Erie Railway for the week ending December 7 were: 1872, \$367,778; 1871, \$327,048; increase, \$40,730, or 12½ per cent.

—The following table shows the coal trade of the different coal regions and railroads of Eastern Pennsylvania, for the eleven months ending November 30, 1872, as compared with the same period last year:

	1872, tons.	1871, tons.
Philadelphia & Reading Railroad.....	3,942,735	3,716,584
Schenectady Canal.....	898,190	1,010,171
Lehigh Valley Railroad.....	3,359,959	2,522,701
Lehigh & Susquehanna Railroad.....	2,374,731	1,806,911
Delaware, Lackawanna & Western Railroad.....	2,636,106	1,683,295
Pennsylvania Coal Company.....	1,135,042	719,030
Delaware & Hudson Canal Co.....	2,658,830	1,728,039
Shamokin.....	538,064	597,143
Upper Merion.....	432,626	439,707
Total anthracite.....	17,916,283	14,253,581
Cumberland.....	2,130,464	2,157,992
Broad Top.....	284,996	298,990
Total anthracite and bituminous.....	20,331,743	16,710,563

Increase in anthracite, 3,662,702 tons; decrease in bituminous, 41,522 tons; total increase, 3,621,180 tons.

—The earnings of the Kansas Pacific Railway for the first week in December were: from passengers, \$22,286.20; freight, \$39,173.27; mails, \$2,055.31; total, \$63,514.78. Of this amount, \$2,976.94 was for transportation of troops, mails and government freight.

—The earnings of the St. Louis & Southeastern Railway (consolidated) for the month of November were \$97,183.24.

—The earnings of the Grand Trunk Railway of Canada for the week ending November 23 were: 1872, \$39,600; 1871, 41,500; decrease, \$1,900, or 4½ per cent.

—The earnings of the Great Western Railway of Canada for the week ending November 23 were: 1872, \$24,633; 1871, \$19,591; increase, \$5,042, or 25½ per cent.

—The earnings of the Richmond & Danville Railroad for the year ending September 30, 1872, were \$834,451.91. The operating expenses were \$470,606.22, leaving the net earnings \$363,845.69. The gross earnings for the previous year were \$758,072.40, and the net earnings, \$344,235.62, showing an increase last year of \$76,379.51, or 10½ per cent in gross earnings, and \$19,610.07, or 5½ per cent in net earnings.

—The earnings of the Pennsylvania Railroad—so a Philadelphia paper reports—for the ten months ending October 31 were: 1872, \$18,228,559; 1871, \$15,630,104; increase, \$2,598,455, or 16½ per cent.

—The receipts of the finished section of the Chesapeake & Ohio railroad (from Richmond to White Sulphur Springs, 227 miles) for the year ending September 30, 1872, were \$777,632.70; operating expenses, \$488,687.34; net receipts, \$288,945.36.

—The following companies have reported their earnings for November, in addition to those published last week:

	1872.	1871.	Increase.	Decr'se.	Pr. ct.
Atlantic & Pacific.....	\$102,940	\$98,302	\$4,638	....	4%
Missouri, Kan. & Texas.....	227,333	117,888	109,445	....	92%
Michigan Central.....	616,024	587,494	28,530	....	4%
Ohio & Mississippi.....	319,159	301,866	17,293	....	5%
Pacific, of Missouri.....	326,668	335,103	....	8,435	2%
St. Lo., Alt. & Ter. Haute.....	178,252	171,366	6,886	....	4
St. Louis & Iron Mt.....	203,731	154,427	49,304	....	32

PERSONAL.

—Mr. George B. Wrestling, the Superintendent of the Mount Alto Railroad Company and the Mount Alto Iron Company, has had his office removed from Fayetteville to Chambersburg, Pa.

—Milton Northrup, General Freight Agent of the Jackson, Lansing & Saginaw Railroad, has resigned his position.

—Mr. Ralph Page, who has been an engineman on the New Jersey Railroad (now the New York Division of the Pennsylvania road) for nearly 35 years and who was the oldest engineman on the road, died a few days since after a short illness, at his residence in Jersey City. Mr. Page was over 60 years of age and leaves three sons, all of whom are in the service of the company, two as enginemen and one as fireman.

OLD AND NEW ROADS.

Free Passes.

There was a meeting of railroad managers in Chicago on the 9th, at which the following regulations concerning passes, which have been heretofore recommended by the Western and Southern Railway Association, were unanimously adopted:

1. The usual reciprocal passes between officers of connecting lines may be given.

2. Passes to traveling agents or employees of other roads shall be granted only on an application from the President, Superintendent or other managing officer, addressed to the President, or other general managing officer of the road over which the pass is solicited. No such request shall be made, except for employees when sent on business of their companies.

3. Half-fare permits may be issued to each clergyman of a congregation on the line of road, or one having supervisory charge of a number of congregations on the line of road, provided such clergyman follow no secular employment.

4. Passes shall not be given for the procurement of business of any kind.

5. One man may be passed on the train with his stock for one or two cars, and two men for three or more cars, two being the maximum number that may be passed on one train with any one shipment of stock, or with any number of shipments for the same owner. No return passes will be given on account of stock shipments, but half-fare tickets may be sold on such account.

6. Passes issued to members of the Legislature shall be limited to the time of the session and for ten days after.

Northern Pacific.

The report of the Commissioners who inspected this road on the part of the Government covers that part of the road in Minnesota (Thomson Junction to Moorhead, 223 miles), and not the section in Dakota built this year. They report that the section examined is found to be well located, both with reference to through and local traffic. The grades are light, three-fourths of the distance being below the average of thirty feet. The sharpest curve is three degrees, in a radius of 2,000 feet. The embankments and excavations are within the requirements of law. The ballasting is well done with gravel. The rolling stock is uniformly of excellent quality and in good condition, and amply sufficient for all present and near future requirements. The engine houses and repair shops are deemed to be adequate. Mention is made of the emigrant houses at Brainerd, Glyndon and Duluth, as being constructed with furniture and cooking utensils for the free use of those intending to settle on the company's or Government lands. The snow fences, water stations and telegraph lines are considered ample for their purposes. The report closes as follows:

"Having found this portion of the road to be judiciously located, well constructed and adequately equipped, and believing that it substantially meets the requirements of both the letter and spirit of the law and department regulations, the Commission recommend its acceptance by the Government."

Mr. George A. Brackett, who returned to Minneapolis about the 7th, from the Dakota portion of the road, where he had been snowed in, reported that there was no snow except in the cuts west of the James River in Dakota Territory. Fifteen days' work in the spring will complete the track-laying to the Missouri River, the grading being finished, and the necessary material on the ground. Mr. Brackett's snowed-in party were fifteen days on the road home, a fraction over half of which they occupied in raising the blockade with shovels.

Rochester, Hornellville & Pine Creek.

This company represents the New York portion of a line projected from Hornellville, N. Y., on the Erie Railway, southward to Williamsport, Pa. The line has been located from Hornellville to the State line, and will probably be put under contract this month. In Pennsylvania companies have been organized for its extension, and are waiting for some necessary legislation to commence active work. The whole line has been surveyed and found practicable. It will intersect the Lawrenceville & Wellbore Railroad near the latter place, and continue along that road to the Antrim coal fields and thence to Williamsport. A correspondent writes that when built it will lessen the distance from Buffalo or Suspension Bridge to Williamsport (and of course to Baltimore, Washington, &c.) 54 miles over the present principal route, and will be at least 32 miles shorter than any other line can be made. A saving of 12 miles is effected between Williamsport and Rochester, N. Y. The road passes through the excellent bituminous coal fields in Pennsylvania, and at Williamsport will compete for the anthracite coal trade. Its projectors confidently believe it will be-

come the main trunk line from Canada and the Northwest by Buffalo, Suspension Bridge or Rochester to Baltimore, Washington and the South, and that it will command a large coal traffic.

The original intention was to run down Pine Creek in Pennsylvania, but the survey of the route and the quantity of coal on that line was not satisfactory.

The Omaha Crossing.

A correspondent of the Chicago Tribune, writing from Omaha, says:

"Up to this time, the Union Pacific has run its trains to the west end of the great Missouri Bridge, and there stopped. The four Iowa roads have run to the east end of the bridge, and refused to come further. The Omaha Bridge Transfer has been operated between them—a little railroad by itself. This cannot continue. The trade of Nebraska and the lion's share of the Union Pacific business, which, owing to its overland Pacific coast connections, is immense, will be given to the first eastern road that runs its trains to Omaha to receive it. This is why the Burlington & Missouri bought the Omaha & Southwestern. It will cross at Plattsmouth, and by that route be running its trains from the Union Pacific depot, in this city, on the 16th inst."

"This connection of the Burlington & Missouri with Omaha would of itself break up the 'pool,' and compel the Iowa roads to cross the bridge. But there is said to be another reason. Horace F. Clark, President of the Union Pacific, now controls the Chicago & Northwestern. It will, after January 1, be used as a link in the great chain extending from San Francisco, through Omaha and Chicago, to New York. The trains of the Chicago & Northwestern will run to and from the Great Union depot to be built next year in this city, and that company will contribute to the cost of its erection."

The distance to Omaha by way of Plattsmouth and the Omaha & Southwestern is 14 miles greater than by way of Council Bluffs.

Boston & Maine.

At the annual meeting of the stockholders of this company, held in Lawrence, Mass., on the 11th, it was voted to issue 6 per cent. gold-bearing bonds to an amount not exceeding \$1,500,000, payable within 20 years, for the purpose of completing the road to Portland and funding the floating debt.

Milwaukee Freight Lines.

The Chamber of Commerce, of Milwaukee, has passed resolutions appointing a committee to recommend to the officers of this company the organization of a freight line to run between Milwaukee and Eastern cities; and another to confer with the managers of existing freight lines, "to urge upon them our claims to a fair quota of cars in winter, in consideration of the large amount of business they receive to and from Milwaukee during other seasons of the year."

Railroad Laws in Indiana.

On the 11th, in the Indiana Senate, the bill to regulate the freight and passenger tariff on railroads was passed—37 yeas to 6 nays. It provides that charges on freight carried a distance of not over twenty miles shall not be more than 100 per cent. per mile more than through rates; more than twenty and less than forty miles, not more than 75 per cent. advance; more than 40 miles, not more than 50 per cent. advance, provided that in no case shall the entire charge exceed the charge for through freight. The rate for passengers is fixed at three cents a mile.

The House bill to enable border counties to extend aid to foreign railroads, in certain cases, was passed. Also the bill to provide for the distribution of stock issued to counties for subscription in aid of railroads among the taxpayers, in proportion to the amount of taxes paid.

Trans-Alleghany Narrow-Gauge.

A bill has been introduced in the Virginia Legislature to incorporate the Richmond and Trans-Alleghany Narrow-Gauge Railway Company for the purpose of constructing, equipping, maintaining and operating a narrow-gauge railroad from or near the city of Richmond, through or near the counties of Powhatan, Cumberland, Buckingham, Appomattox, Campbell, Bedford, Franklin, Floyd, Pulaski, Bland, Giles, Tazewell, Russell, Scott and Lee, or Buchanan and Wise, to the State line, by such route as may be found by actual survey most advantageous and expedient for the development of the agricultural, mining and manufacturing resources of the counties named, and with a view to connection beyond the limits of the State. The capital stock of the company is to be \$6,000,000 in the beginning, and it is desired that it may be increased at any time to a sum not exceeding \$2,000,000, to be divided into shares of \$100 each.

Cincinnati, Lafayette & Chicago.

The proceedings of the stockholders of this company at a meeting held at Sheldon, Ill., November 30 (at which the directors were empowered to organize under the act approved March 1, 1872, which provides that one-fourth of the directors shall be appointed by the Governor), have been filed in the office of the Secretary of State at Springfield, Ill.

Chicago & Northern Pacific Air-Line.

The by-laws of this company have been filed in the office of the Secretary of State at Springfield, Ill.

Omaha & Southwestern.

The first train passed over the Patte River bridge December 10.

Salt Lake City & Echo.

Arrangements are being made to build a narrow-gauge railroad, about 45 miles long, from Salt Lake City to Echo City, on the Union Pacific 39 miles east of Ogden.

Sheboygan & Fond du Lac.

This railroad is now open for business from Ripon westward to Princeton, Wis., 20 miles, which portion has been constructed during the past season. The new Superintendent, Mr. Brandon Mozley (succeeding Col. C. C. Smith), was connected with the Union Pacific during its construction, and for two years has been in the general office of the Michigan Central at Detroit.

New York & Harlem.

Ground has been broken for the "Fourth Avenue Improvement" between Seventy-ninth street and the Harlem River. Men are laying side tracks at the Yorkville rock tunnel, and erecting trestle work between Ninety-sixth street and One Hundred-and-Fiftieth street. Excavations were begun at Harlem on the 17th. The proposals for the work (tunnels and bridges, chiefly) between Forty-ninth street and Seventy-ninth were opened on the 16th. The awards were to be made this week.

Central Pacific.

A freight train of sixteen cars entirely loaded with tea left San Francisco on the evening of December 3. The train, which carried about 160 tons of tea, was a special, and was to be run through to New York with as little delay as possible.

Intercolonial.

The commissioners for the construction of this railroad are ready to receive proposals for the track-laying and ballasting of sections 3, 6, 9 and 15 of Division No. 1, about 78 miles; on sections 16, 19 and 20 of Division No. 2, about 46 miles; and on sections 21, 22 and 23 of Division No. 3, about 72 miles—all in New Brunswick. Information can be had at the office of the Chief Engineer in Ottawa, Ont., and at the engineers' offices at

Rimouski, Dalhousie, Newcastle and Moncton, N. B. Bids will be received until noon of January 31. Bids are asked for passenger, freight and engine houses in Campbellton, N. B., and for a passenger house at Newcastle, N. B.

Welland Canal.

The Canadian Department of Public Works advertises for proposals, to be handed in by noon of January 10, for the construction of nine locks and weirs and the intervening works on the new portion of the Welland Canal between Thorold and Port Dalhousie. This work will be let in sections. Tenders will be received, also, for parts of the enlargement of the canal above Port Robinson. Maps, plans and specifications are now to be seen at the office of the Department, in Ottawa, Ont., and similar information may be had at offices of the resident engineers in Thorold and Welland.

Chesapeake & Ohio.

The tunnel under Church Hill, Richmond, which will give this road an approach to the docks on James River just below the city, was opened on the 14th. It will be ready in a few weeks for the passage of trains. On the road in West Virginia there remained 17 miles to complete at that date. It is believed that the entire line will be opened early in January.

Dividends.

The Delaware & Hudson Canal Company on and after Jan. 2 will pay 3 1/2 per cent. on the shares of the Albany & Susquehanna and 4 per cent. on those of the Rondelaer & Saratoga Company. The transfer books were closed on the 14th.

Booneville & Port Ontario.

The preliminary surveys of this road from Booneville, N. Y., on the Utica & Black River road, west to Port Ontario on the lake, about 20 miles east of Oswego, have been completed. The length of the road is about 45 miles. The line has been definitely located from Booneville to Salmon River Falls, 25 miles. It is expected that work will be commenced in the Spring.

Sturgeon Bay Canal.

This canal, which will be but a mile and a quarter long, will connect Green Bay, at a point about 50 miles south of its mouth at "Death's Door," with Lake Michigan, and shorten by about 100 miles the voyage for vessels from Green Bay points to Chicago and Milwaukee. The contractors, Messrs. Axtel, Harris & Gutches, began work July 9, and since that time have removed 87,000 yards by dredge, and 94,700 yards of dry excavation, besides clearing the whole route of timber. The officers of the company are: President, William B. Ogden; Vice-President, Thomas H. Beebe; Secretary, Joseph Harris; Assistant Secretary and Treasurer, William E. Strong; Directors, Wm. B. Ogden, Thomas H. Beebe, Charles D. Robinson, Isaac Stevenson, F. B. Gardner, Joseph Harris, Jesse Spaulding. The office is in Chicago.

North Carolina.

A banker writes to the New York Bulletin that the object of the suit brought by Swasey and other holders of North Carolina bonds against the North Carolina Railroad Company and the public treasurer, in the United States Circuit Court, was to divert from a general application to the ordinary governmental expenses the dividends accruing to the State upon the \$3,000,000 of stock she holds in this railroad, and have them applied to the payment of the coupons of those bonds she had issued in payment of this stock. At the June term, 1872, of the court, held at Raleigh, N. C., the preliminary injunction which had been granted at a previous term to restrain the railroad company from paying these dividends to the public treasurer was made perpetual, and these bonds were also declared by the court to be a lien upon this stock and all dividends. A distribution of \$256,500 then in the hands of the Receiver was ordered recently, and he is paying 80 per cent. of the coupons due. January 1 another dividend from the company will be paid to the Receiver, and by him to the bondholders. The road has been leased for a term of years at 6 1/2 per cent. upon the stock, which is ten times as much as the bonded debt.

Mexican National.

A telegram from Mexico announces that the fact that the Rosecrans railroad project has been referred to the President is considered to give it a slight advantage, as Congress will adjourn before his report can be acted on. It is supposed that the Plumb and Rosecrans projects will be presented jointly to Congress at its next session. One member of Congress opposed the railroad projects in a speech, on the ground that their accomplishment would ruin the business of transportation by mules and bring a large number of immigrants, who would ultimately absorb the country. The Americans, he said, were the greatest enemies of the Mexicans. The speaker was frequently hissed by the galleries.

Columbus & Hooking Valley.

This company has declared a cash dividend of 5 per cent., and a stock dividend of 10 per cent., both payable February 1, 1873. An increase of capital stock amounting to 10 per cent. of the present capital is authorized to be subscribed for pro rata by the present stockholders, to be paid for in two installments, payable February 1 and March 1, 1873. This issue is to provide now and much needed rolling stock. This will increase the capital stock from \$1,250,000 to \$1,500,000.

Cincinnati & Portsmouth.

A company is to be organized to build a railroad from Cincinnati east to Portsmouth, Ohio, a distance of about 90 miles. The section of country through which it will pass is not very well supplied with railroads, depending principally upon the river for transportation.

Utah Northern.

The time table of this road shows trains running from Brigham Junction on the Central Pacific road to Hampton's, 25 miles. The stations and distances from Brigham Junction are: Box Elder, 4 1/2; Oak's Fort, 11 1/2; Honeyville, 14; Dowsyville, 15; Hampton's, 25.

Utah Southern.

Regular trains are running to Lehi, 31 miles south of Salt Lake City. The stations and distances from Salt Lake City are: Big Cottonwood, 6 miles; Little Cottonwood, 7; Jordan, 9; Sandy, 13; Draper, 17; Point, 24; Lehi, 31.

Indianapolis, Block Coal & Western.

This company has asked the city of Indianapolis for a subscription of \$500,000. A very strong opposition to the proposition is manifested, it being urged that the city now has sufficient communication with the coal regions to secure an abundant supply at reasonable prices.

Chicago & Michigan Lake Shore.

On the Muskegon & Big Rapids Branch, iron is laid to Fremont Centre, 20 miles from Muskegon, and the grading is nearly completed to Big Rapids.

Wheeling & Lake Erie.

A report recently made to the Common Council of Wheeling, West Va., by the President of this company, states that the local subscriptions amount to \$941,950, and that of the city of Wheeling to \$300,000, in all \$1,241,950. The Engineers' estimates for the line from Martin's Ferry to Zoar, 55 1/2 miles, amount to \$2,155,290; and from Zoar to Sandusky, 104 1/2 miles, to \$2,435,347, being \$4,590,637 for the distance of 160 miles, or about \$28,690 per mile. The Keystone Bridge Company has offered to construct the bridge over the Ohio at Wheeling

(a single-span iron bridge), for \$850,000, and the estimated cost of the approaches is \$110,000. To meet the cost of the bridge, the city of Wheeling has subscribed \$300,000, the county \$100,000, and the Wheeling & Lake Erie Company \$400,000, in all \$800,000.

Cairo & Fulton.

The engineer in charge of the construction of this road reports that track is laid 11 miles south of the Missouri State line and that a gap of only 20 miles remains to complete the road to Little Rock, Ark. This is an increase of 85 miles of track since last reports.

Preparations are being made to open the necessary offices in Little Rock, as it is expected that trains will run from St. Louis to that point by January 1. A transfer boat will be used at that point until the bridge over the Arkansas is completed.

A branch is proposed from Austin, in Pulaski County, south to Pine Bluffs on the Arkansas River, a distance of about 50 miles.

Mississippi Central.

The bridge over the Yallobushes River at Grenada, Miss., owned in common by this and the Mississippi & Tennessee Company, was burned on the afternoon of the 14th, having caught fire from sparks from a locomotive. It is reported that it will require several weeks to rebuild it.

Paducah & Memphis.

The track is now laid for 71 miles from Paducah, and eight miles beyond Troy, Tenn., to which point trains have been running, and the road is ready for the iron some seven miles further. The company has a quantity of iron at Memphis, and will commence to lay iron from Memphis northward soon.

Northern Central, of Michigan.

Construction trains now run to Lansing, Mich., and the track is nearly completed to that place. Lansing is 17 miles north of Easton Rapids, the late terminus.

Mansfield, Coldwater & Lake Michigan.

The Detroit Tribune, of December 10, says: "The Mansfield, Coldwater & Lake Michigan Railroad is in a more promising situation, and though iron is down from Mansfield to Tiffin, track-laying will progress considerably this winter, and on the route between Tiffin and Toledo, it is already done. About three miles are laid south of Monteith, and more will be done in that vicinity as soon as a heavy cut there is completed."

Ripley Narrow Gauge.

It is proposed to extend this road from Middleton, Tenn., the present northern terminus, north through Bolivar to Denmark, a distance of about 36 miles.

Memphis & Vicksburg.

This road has been graded about 15 miles north from the Yazoo River. This section comprises the heaviest work on the line.

Pioche & Bullionville.

The grading for this road, the first road in Southeastern Nevada, is nearly completed, and the iron has been purchased. Its completion may shortly be looked for.

Missouri, Kansas & Texas.

A branch road from Parsons, Kan., on this road, southwest to Parker, the southern terminus of the Leavenworth, Lawrence & Galveston road, is proposed, and \$30,000 has been voted to build the road, which would be about 30 miles long.

Atchison & Nebraska.

The engine house and repair shop at Atchison, Kan., were destroyed by fire, December 10. The amount of loss is not stated.

Port Royal.

Under date of the 13th the Engineer informs us that this road was then completed 82 miles from Port Royal, S. C., and three miles from Augusta, Ga., leaving a gap of only 24 miles to complete the road, which is to be completed in February. He reports that the business now pays three times the working expenses and repairs; but the through traffic from Augusta and beyond to deep water was what the road was built for, and is expected to give most of the profits.

Vermont Central.

The Vermont & Canada Railroad Company has brought a suit in chancery against the Vermont Central for the semi-annual rental of \$120,000, due to the Vermont & Canada Company December 1, and which has not yet been paid. The Vermont Central takes this extraordinary line of defence—that the floating debt of one or two millions incurred in running the road constitutes a first lien on all income and property, because "unless trustees can be protected by the court in incurring and paying operating expenses, no person would be found to accept a trusteeship." This has the effect to invalidate all the mortgages, or at least bury them one stratum deeper.

The Vermont Central has sold to the Delaware & Hudson Canal Company the lease of the Whitehall & Plattsburg Railroad from Leicester Junction to Port Henry, with the bridge across Lake Champlain at Ticonderoga. The section from Ticonderoga to Port Henry will be used as part of the New York & Canada road, now being built.

The Ogdenburg (N. Y.) Journal states that the company commenced to pay an installment of 20 per cent. on all old outstanding vouchers, December 10. In 20 days a second installment of 20 per cent. will be paid, and this will continue until all outstanding claims are liquidated. Vouchers accruing since September 1 are paid in full.

Lee & New Haven.

The company has made another assessment of 10 per cent. on the capital stock, and is soon to begin work on the Lee end of the road.

Vermont & Massachusetts.

This company, it is reported, is preparing to petition the Massachusetts Legislature for an act authorizing the consolidation of the line from Boston to Troy by the Hoosac Tunnel.

Buffalo, New York & Philadelphia.

The track is laid from Emporium, Pa., to the salt works, leaving a gap of only five miles to be laid to complete the track from Buffalo to Emporium. This is nine miles more of track than at our last accounts. It is expected that the road will all be ballasted and regular trains commence running by January 1, 1873.

New Mail Route.

From January 1 mail service will be extended from Wellabro, Pa., to Antrim, 13.6 miles, on the Wellabro & Lawrenceville Railroad.

Hoosac Tunnel.

The heading east from the central shaft and that from the east end met December 12, and an opening was made on that day sufficiently large for a man to pass through. The engineers have not yet had an opportunity to verify their calculations, but it is thought that the error in driving the headings will prove to be not more than one foot. A great advantage gained by the completion of this opening is that the tunnel can now be drained from the eastern end, and the heavy pumping machinery now in use at the central shaft can be dispensed

with. Work will now be actively prosecuted on the heading west from the central shaft. Since the opening has been made, there has been a very strong current of air from the east end through the tunnel and up the central shaft. This, it is thought, will have an important bearing on the question of ventilation, when the tunnel is completed.

Ashtabula, Youngstown & Pittsburgh.

The track at the crossing of the Atlantic & Great Western Railroad at Warren, O., has been completed. About one-half mile of track remains to be laid to complete the road from Ashtabula to Youngstown.

Indianapolis & St. Louis.

A branch line from Carbon, Ind., 53 miles west of Indianapolis, northwest to the coal fields of Otter Creek in Clay County has been completed and is ready for business.

Peoria, Pekin & Jacksonville.

The Peoria (Ill.) Transcript reports that the Toledo, Wabash & Western Company has made arrangements to run its trains over this road between Pekin and Peoria, as soon as the Indianapolis, Bloomington & Western trains shall commence running on the track of the Peoria & Springfield road between those two points.

Pennsylvania Petroleum.

Of the present condition of this road, the Titusville (Pa.) Herald, of December 12, says:

"Of this new road 3 1/2 miles are now ready for the track, six miles of track have been laid from Pithole to Petroleum Center, 1,500 tons of iron have been bought, all of the masonry of the line has, we believe, been completed, except the bridge over Oil Creek and one pier of the bridge over Pine Creek, and the expenditures on right of way and construction have already reached \$100,000."

The length of the road from Tidionts, by way of Titusville, to Cambridge on the Atlantic & Great Western Railway, is about 40 miles. The extension from Cambridge to Erie, of which a part is under contract, will be 36 miles long, the branch from Tidionts to Enterprise 13 miles, and from Pleasantville to Colorado five miles, making in all about 94 miles of railroad.

Bangor & Bucksport.

The surveys for this road are nearly completed. The city of Bangor, Me., has been asked to subscribe \$150,000 to the stock.

European & North American.

The night express train with Pullman coach attached now running between Bangor, Me., and St. John, N. B., is to be discontinued. Its place will be supplied by an express freight with passenger car attached.

Pittsburgh, Washington & Baltimore.

The company has decided to build the new machine and repair shops at Connelville, Pa., and not at Cumberland, Md.

Milwaukee & St. Paul.

The company has renewed the offer which was made to the city of La Crosse some time ago, when the discussion about the location of the bridge at that place first commenced. The company will agree to lay a track to the foot of State street, La Crosse, and run a first-class coach from that point to connect with all trains at the bridge, provided the city will give the right of way and depot grounds. It will be remembered that the bridge, as located by the company, will be some two miles north of the city.

The new line from Winona, Minn., to La Crosse is nearly completed, only nine miles of track remaining to be laid. The new depot in Winona is almost finished and the ballasting is progressing rapidly. It is expected that by January 1 trains will run through from St. Paul to La Crosse by this route.

Dallas & Wichita.

Work on this road was commenced, with appropriate ceremonies, at Dallas, Texas, November 28. The contract for the first section has been let.

Milwaukee & Northern.

The track of this road is now completed from Milwaukee to Menasha Junction, a distance of 83 miles. From Menasha Junction to Menasha, 16 miles, the track is laid and two trains are at work finishing the ballasting. From Menasha Junction to Green Bay, 27 miles, the grading and bridge-work is all finished and the ties are distributed along the road. The track is to be laid early in the spring. North of Green Bay, the right of way has been secured as far as Shawano, 36 miles, and contracts for clearing have been let. The general course of the road from Milwaukee to Green Bay, 110 miles, is nearly due north, the branch from Menasha Junction to Menasha running nearly due west, or at right angles to the main line. From Green Bay to Shawano the course will be northwest.

Indianapolis, Bloomington & Western.

It is reported that the through trains from this road will be run hereafter over the Junction and Cincinnati, Hamilton & Dayton roads to Cincinnati, instead of going by the Indianapolis, Cincinnati & Lafayette, as at present.

West Wisconsin.

Track-laying on the Extension from Camp Douglas to Elroy on the Madison Extension of the Chicago & Northwestern has been completed nearly to the tunnel from both ends.

Chippewa & Red Cedar.

The surveys have been completed from Chippewa, Wis., to the Mississippi. The road follows the course of the Chippewa River nearly the whole distance, and will be about 60 miles long.

Winona & St. Peter.

The second snow blockade on this road has been raised, and all the disabled engines brought to New Ulm, Minn. The construction parties are being reorganized, and the work of construction is to be pushed west of Marshall, in order to complete the road this year, if possible. A force of men is to be kept at Burns and other points along the line to keep the cuts clear and prevent another snow blockade.

Boston & Maine.

The track on the Maine Extension is now completed, and a passenger car, with several of the officers of the road, passed over it to Portland, Me., December 14.

Green Bay & Lake Pepin.

The track is now laid from the east to a point two miles west of Dexterville, which is 116 miles from Green Bay and 19 miles beyond Grand Rapids, the late terminus. Track-laying west from Merillon is also progressing rapidly, and there remains a gap of only 25 miles to be filled to complete the road to Merillon, where it will cross the West Wisconsin. On this section the grading is completed for 23 miles, leaving about two miles of grading yet unfinished.

Southern Minnesota.

The work of filling up the long trestle-work between Hokah and Grand Crossing has been commenced.

Atchison, Topeka & Santa Fe.

The road is completed to a point 60 miles beyond Fort Dodge and 412 miles from Atchison, Kansas. It was expected that the track-layers would reach the State line, 37 miles further, by December 20. When the track reaches the State line, work will be suspended until spring.